

INSTALLATION CHECKLIST

| Done? | # | Description | Reference |
|-------|----|--|--|
| | 1 | For a sign using a wireless transceiver, conduct a site survey to determine where to locate the wireless transceiver that will send messages to the sign. | Contact Adaptive Technical Support. |
| | 2 | Assemble multiple sections. | "Sign sections" on page 9. "Identifier label" on page 12 |
| | 3 | Mount the sign sections to a superstructure able to withstand live loads and comply with all national and local codes. | "Mechanical installation" on page 14. |
| | 4 | Connect the cabling and wiring between each section. | "Multiple section sign assembly and wiring" on page 16. |
| | 5 | Determine <i>sign-to-sign</i> connection method to be used (multiple sign installation only): <input type="checkbox"/> Master/Secondary Master <input type="checkbox"/> Master/Slave | "Sign-to-sign connections" on page 25. "Serial address of a sign" on page 34. |
| | 6 | Connect <i>sign-to-sign</i> communication wire (multiple sign installation only). | "Sign-to-sign connections" on page 25. |
| | 7 | Determine <i>sign-to-computer</i> connection method to be used: <input type="checkbox"/> Wired (RS485): sign serial address _____ <input type="checkbox"/> Modem: sign serial address _____ <input type="checkbox"/> Wireless transceiver: sign serial address _____ <input type="checkbox"/> Fiber optic cable: sign serial address _____ | "Computer-to-sign connections" on page 28. |
| | 8 | For a sign using a wired (RS485) or a fiber optic cable, connect <i>sign-to-computer</i> communication wire. | "Computer-to-sign connections" on page 28. |
| | 9 | Install temperature probe (optional). | "Temperature probe mounting (optional)" on page 19. |
| | 10 | Connect power and ground to the sign. | "Electrical installation" on page 21. |

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Due to continuing product innovation, specifications in this manual are subject to change without notice.

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Introduction

Revision history

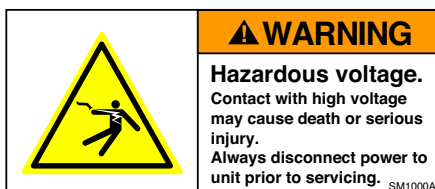
| Revision | Date | Notes |
|-----------|----------------|----------------|
| 9717-5001 | March 11, 2005 | First release. |

Related documentation

| Part # | Manual title | Description |
|-----------|----------------------------------|---|
| 9708-8081 | AlphaNET Version 3.0 User Manual | Explains the software used to create and send messages to the sign. |

Safety

Warnings and cautions

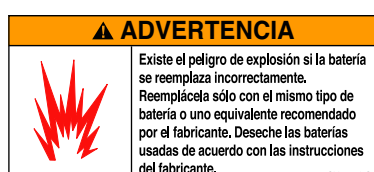
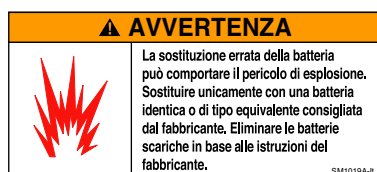
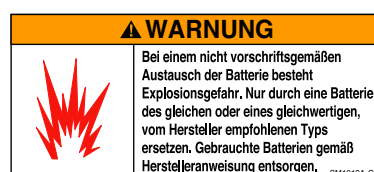
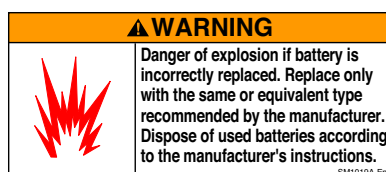
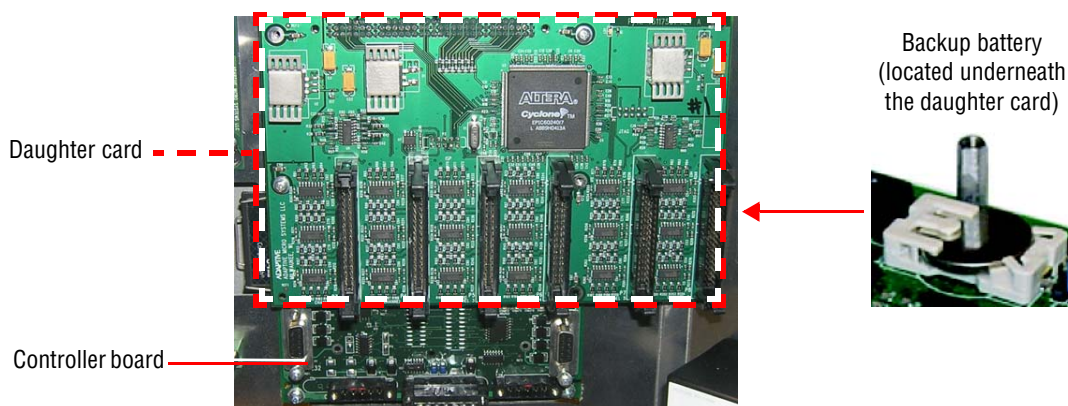


Other warnings and cautions are posted in appropriate locations throughout this manual.

Battery backup

In the event of power loss, backup batteries in an AlphaEclipse RoadStar sign provide power in order to maintain time.

A backup battery is located on the top of a sign's controller board under the daughter card (see below). The backup battery should only be replaced by a qualified Adaptive technician:



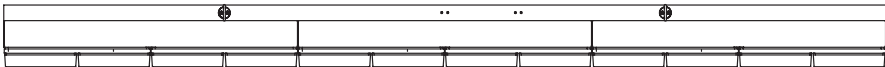
Equipment overview

Description

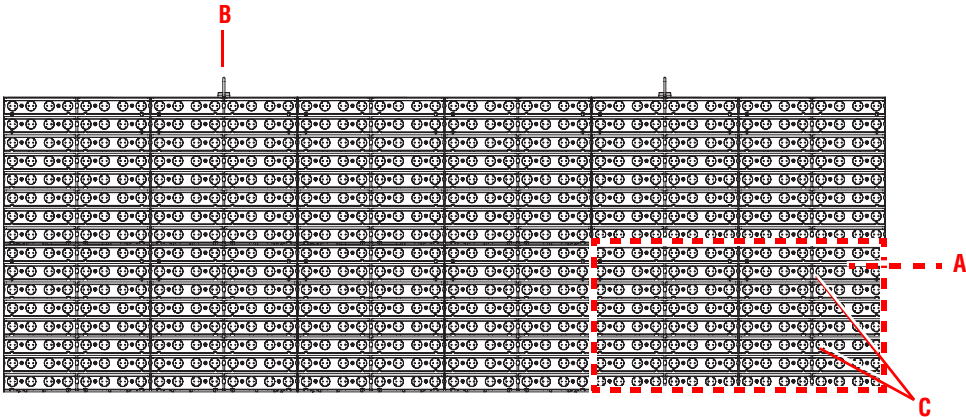
Top and front views

Shown below is a 16 x 48 (row x column) sign. Other sign sizes are similar.

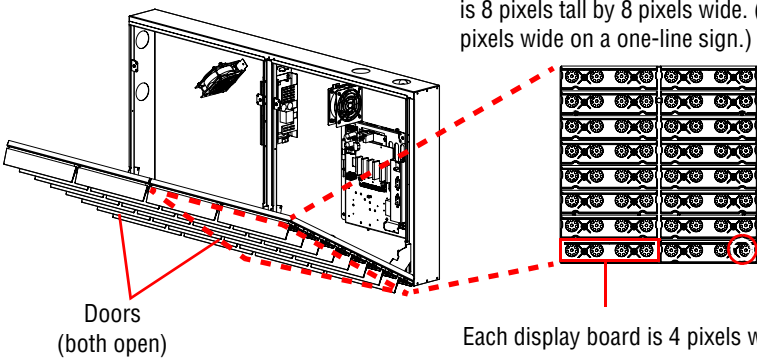
Top view



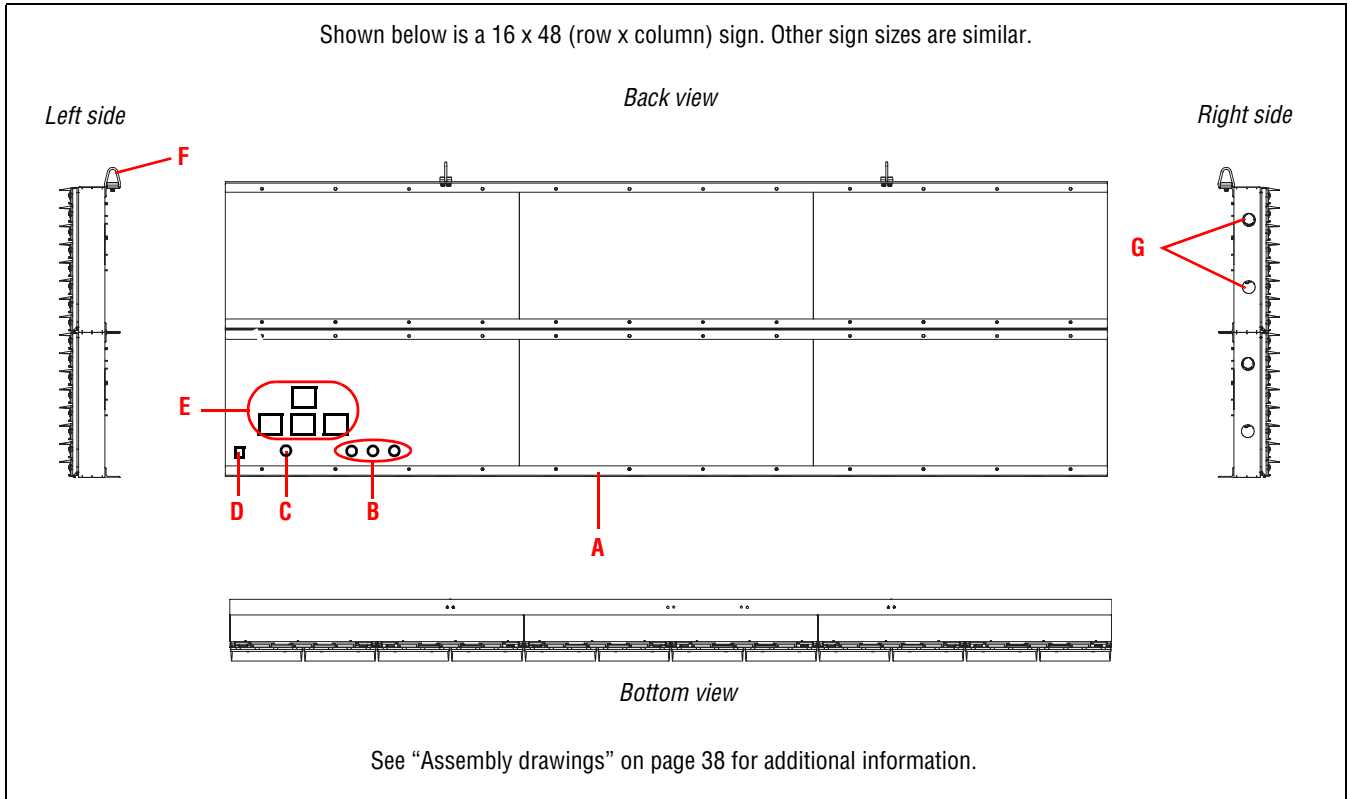
Front view

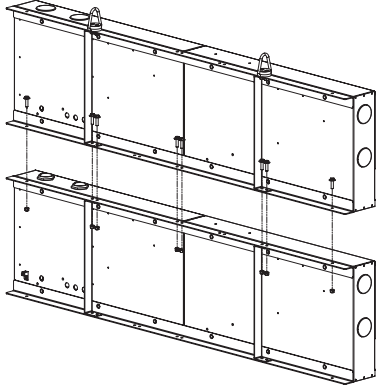


See “Assembly drawings” on page 38 for additional information.

| Item | Name | Description |
|------|-------------------|--|
| A | Cube | <p>Each cube has two doors, each with 16 louvered display boards. (Note that one-line sign cubes will only have 14 louvered display boards.)</p> <p>The group of display boards on each cube door is 8 pixels tall by 8 pixels wide. (7 pixels tall by 8 pixels wide on a one-line sign.)</p>  <p>Doors (both open)</p> <p>Each display board is 4 pixels wide.</p> <p>A single LED pixel.</p> |
| B | Lifting hardware | Used to lift the sign during installation. This hardware must be removed after the sign is installed or corrosion to the sign may occur. |
| C | Light sensor hole | Allows light into the light sensor. This opening must be kept free of obstructions. The location of the light sensor may vary depending on the pitch (distance between pixels) of the sign. Shown above are the two possible locations. |

Back, side, and bottom views

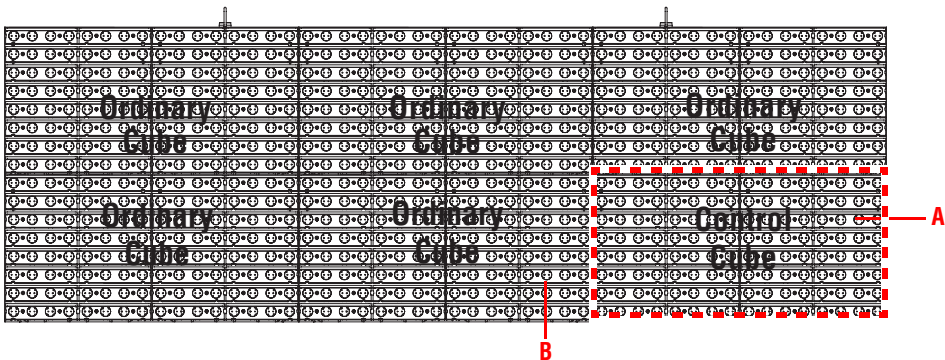


| Item | Name | Description |
|----------|------------------------------|---|
| A | Section support frame | Each section is attached to a support frame:  |
| B | Communications conduit holes | 7/8-inch conduit holes for communication wires. (Remove hole plugs prior to use.) |
| C | Power conduit hole | 7/8-inch conduit hole for power wires. (Remove hole plugs prior to use.) |
| D | Ground lug | Grounding point for earth ground. See "Ground the sign" on page 22. |
| E | Equipment labels | Section label, sign label, identifier label, and serial address label containing information about the sign. Sign sections will contain one or more of these labels depending on whether the section is a main or a secondary section. See "Equipment identification" on page 10. |
| F | Lifting hardware | Used to lift the sign during installation. This hardware must be removed after the sign is installed or corrosion to the sign may occur. |
| G | Wireway connection holes | Used to route power and communication wires between each LED module. |

Internal view

Shown below is a 16 x 48 (row x column) sign. Other sign sizes are similar.

See "Assembly drawings" on page 38 for additional information.

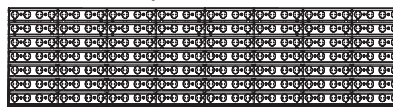


| Item | Name | Description |
|------|---------------|--|
| A | Control cube | <p>Power and communication wires are routed to all the sections from the control cube. There is one control cube in a sign and it is located at the bottom right side of the main section (see "Sign sections" on page 9). The control cube contains the controller plate (see below):</p> <p>NOTE: Signs configured as Master contain the controller board and communication options.</p> <p>Regulator board</p> <p>Controller plate</p> <p>Controller board</p> <p>Power switches</p> <p>Power terminal block</p> <p>Surge suppressor board</p> <p>Wiring terminal block</p> <p>Sign doors</p> |
| B | Ordinary cube | <p>Ordinary cubes are found in all secondary sections (see "Sign sections" on page 9) and in all main sections <i>except</i> the very bottom right cube (this is the control cube). The parts inside an ordinary cube can be accessed by opening the front of the cube (see "How to open a section door" on page 35):</p> <p>Cooling fan (See "Technical specifications" on page 42 as the number of fans vary.)</p> <p>Power supply</p> <p>LED driver board (back)</p> <p>WARNING Burn hazard. Hot surface. Do not touch.</p> <p>Open a sign door slowly to prevent damage to internal components.</p> |

Sign sections

All sign sizes are made up of one or more building blocks, called sections. The right-most section is always the main section (1 of X number of sections); all others are secondary sections.

- One-line signs
- Small building block
 - two cubes
 - 7 rows by 32 columns



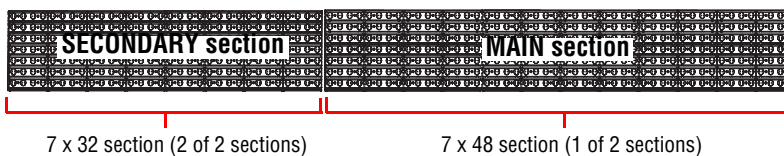
7 x 32 section

- Large building block
 - three cubes
 - 7 rows by 48 columns



7 x 48 section

For example, a 7 x 80 one-line sign is made up of one 7-row, 32-column building block and one 7-row, 48-column building block:

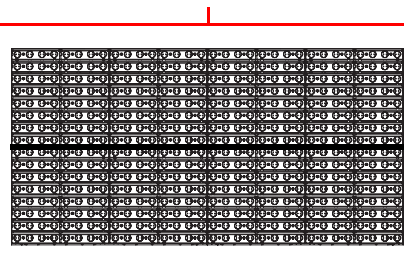


Note: The main section must always be on the far right, as viewed from the front of the sign.

Two-line signs

- Small building block
 - four cubes
 - 16 rows by 32 columns

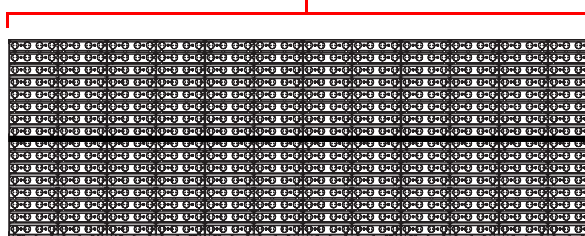
8 x 32 section



8 x 32 section

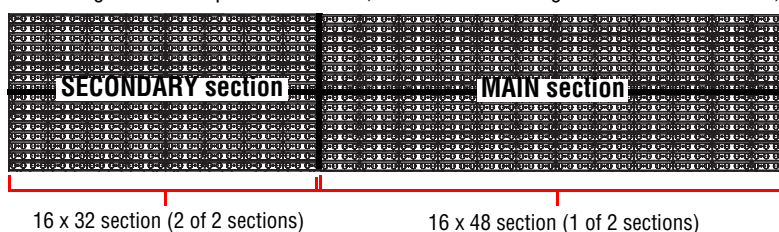
- Large building block
 - six cubes
 - 16 rows by 48 columns

8 x 48 section



8 x 48 section

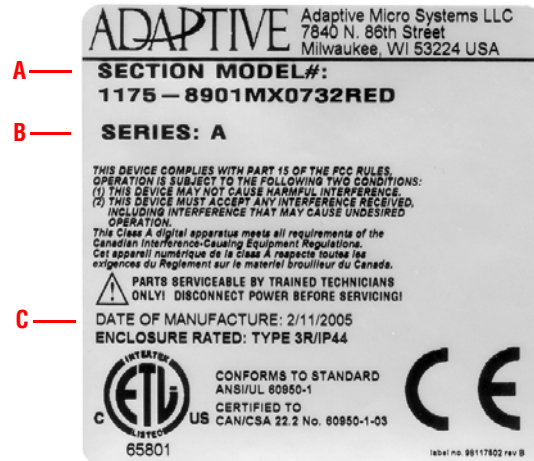
For example, a 16 x 80 two-line sign is made up of one 16-row, 32-column building block and one 16-row, 48-column building block:



Note: The main section must always be on the far right, as viewed from the front of the sign.

Section label

Section labels are located on the back of each sign section. See “Sign sections” on page 9.



| Item | Name | Description |
|----------|----------------------|---|
| A | Section model number | <p>Identification number for the section:</p> <p>1175-8901MX0732RED</p> <ul style="list-style-type: none"> LED lamp color: <ul style="list-style-type: none"> • RED = Red • AMB = Amber Number of pixel columns Number of pixel rows Section configuration <ul style="list-style-type: none"> • MX = Main Section • SX = Secondary Section • MS = Main Secondary Angle of visibility: <ul style="list-style-type: none"> • 00 = 30° • 01 = 70° Pitch (mm) AlphaEclipse RoadStar Series Sections |
| B | Series letter | Revision level of sign. |
| C | Date of manufacture | Month, day, and year the sign was made. |

Sign label

Sign labels are located on each main section, one on the outside and one on the inside. See “Sign sections” on page 9.

| <div><div><div>A</div><div>B</div><div>C</div><div>D</div></div><div><div>ADAPTIVE</div><div>Adaptive Micro Systems LLC 7840 N. 86th Street Milwaukee, WI 53224 USA</div><div>SIGN MODEL#: RS8901-16X160-RED</div><div>S/N: ES00000024</div><div>SERIES: A</div><div>VOLTS: 120</div><div>FREQUENCY: 50/60 Hz</div><div>AMPS: 15A</div><div>⚠ PARTS SERVICEABLE BY TRAINED TECHNICIANS ONLY! DISCONNECT POWER BEFORE SERVICING!</div><div>9041-160 00117001 rev B</div></div></div> | | |
|---|------------------------|--|
| Item | Name | Description |
| A | Sign model number | <div>Identification number for the assembled sign: RS8901-16x160-RED</div> <div><div><div>LED lamp color:<ul style="list-style-type: none">RED = redAMB = Amber</div><div>Number of pixel columns</div><div>Number of pixel rows</div><div>Angle of visibility:<ul style="list-style-type: none">00 = 30°01 = 70°</div><div>Pitch (mm)</div><div>Product name (AlphaEclipse RoadStar)</div></div></div> |
| B | Serial number | Consecutive, unique identification number for the sign. |
| C | Series letter | Revision level of sign. |
| D | Electrical information | Input voltage, frequency, and total amperage of sign. |

Identifier label

Identifier labels are located on the back of each sign section near the section label. See “Sign sections” on page 9.

A

B

C

ADAPTIVE Adaptive Micro Systems LLC
7840 N. 86th Street
Milwaukee, WI 53224 USA

TEST S/N: ES00000024B



SECTION:
2 OF 2

ADAPTIVE Adaptive Micro Systems LLC
7840 N. 86th Street
Milwaukee, WI 53224 USA

TEST S/N: ES00000024A



SECTION:
1 OF 2

| Item | Name | Description |
|------|-----------------------|---|
| A | Serial number | Consecutive, unique identification number for the sign (see sign label), plus a letter suffix that indicates assembly location of sign. |
| B | Serial number barcode | The serial number expressed as a barcode. |
| C | Section number | Indicates assembly location of section. |

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Equipment overview

Temperature protection

If the temperature inside of the left-most or right-most cube exceeds 100°F (+/- 7°F) or 38°C (+/- 4°C), the cube's fans will start. When the temperature falls below 80°F (+/- 10°F) or 27°C (+/- 6°C), the fans will stop.

The fans do not draw in outside air. They are used for recirculating air within the sign cubes.

If the power supply ambient temperature reaches 194°F (+/- 9°F) or 90°C (+/- 5°C), the power supply will shut down.

Equipment symbols



Chassis ground



Power (I = On, 0 = Off)

Preventing electrostatic discharge damage



This equipment contains components that may be damaged by “static electricity”, or electrostatic discharge. To prevent this from happening, be sure to follow the guidelines in Adaptive Tech Memo 00-0005, “*Preventing Electrostatic Discharge (ESD) Damage*,” available on our Web site at <http://www.adaptivedisplays.com>.

EMI compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with installation guidelines, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Installation

NOTE: See “Multiple section sign assembly and wiring” on page 16 for specific information on sign assembly and wiring.

Mechanical installation

Overview

Because every sign installation is unique, there is no single procedure for mounting AlphaEclipse RoadStar signs. *However, sign sections must be supported (affixed to superstructure able to withstand live loads and comply with all national and local codes) prior to assembling the sections or opening the doors, otherwise sign may tip causing serious injury. Additionally, sign parts could sustain damage if the doors are opened and the sign is not fully off the ground. Failure to comply will void the sign's warranty.*

This section is only intended as a guide.

All installations, superstructure designs, and connections must be designed and approved by a qualified structural engineer. Call Adaptive Micro Systems at 1-800-558-7022 for contact information for structural engineering consultants.

- Drill holes as needed in the sign's steel framework for fasteners. *Drilling holes in any of the excluded areas will void the sign's warranty.* When drilling holes, follow these guidelines:
 - Connections must be analyzed by a structural engineer.
 - Dissimilar metals must be isolated to avoid galvanic corrosion.
- Any area on the sign's frame that had paint removed during mounting must be recoated with paint that is UL recognized to standard UL-1332, category DTOV2. *Failure to repaint the area will result in accelerated corrosion of the sign's structure. Adaptive Micro Systems is not responsible for any failure in the sign's structure because of this. Failure to comply will void the sign's warranty.*

Support structure design

The design of a sign's support structure depends on a number of factors:

- mounting methods
- building codes
- foundation
- sign size
- sign weight
- sign height
- wind loading
- seismic loading

Ventilation requirements

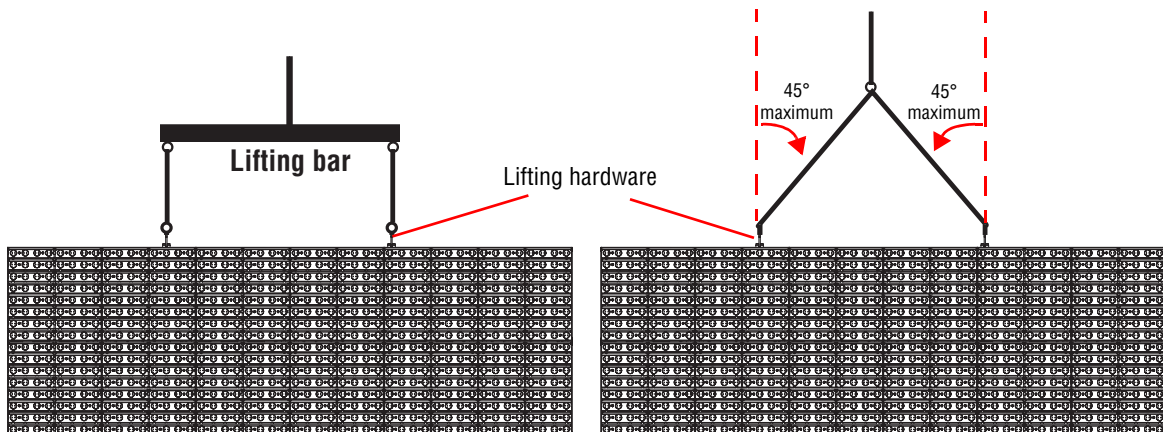
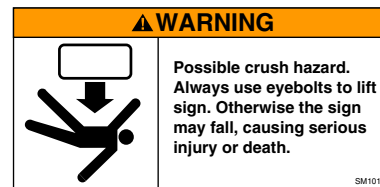
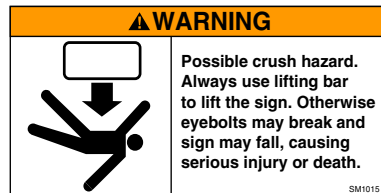
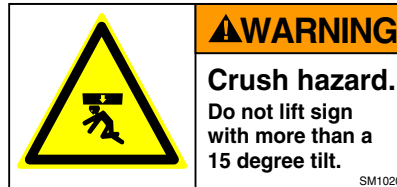
If the sign is mounted to a solid surface like a wall, then nothing must block the space between the top, bottom, and sides of the sign and the solid surface. Allow 6-inches of space (minimum) between the sign and any solid surface.

To avoid heat build-up and depending on sign size, allow more space at the back of the sign to provide ample air flow. Fans can be used to supplement natural air flow. Shading the back of the sign will enhance thermal performance.

Lifting the sign

Use a lifting bar adjusted to the width of the lifting hardware on the sign to raise the sections. After mounting the sign sections, remove the lifting hardware or corrosion to the sign may occur.

NOTE: Sign sections must be supported (affixed to superstructure able to withstand live loads and comply with all national and local codes) prior to assembling the sections or opening the doors, otherwise sign may tip causing serious injury.



RECOMMENDED

NOT RECOMMENDED

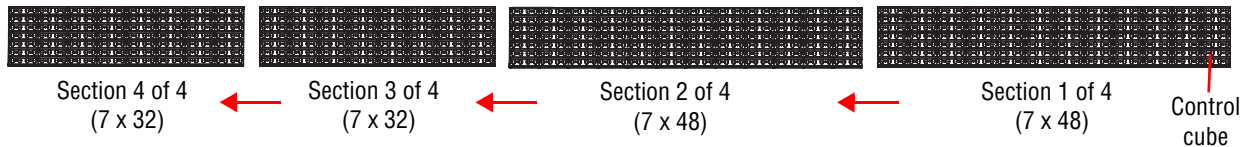
Multiple section sign assembly and wiring

Large AlphaEclipse RoadStar signs are shipped from the factory in multiple sections.

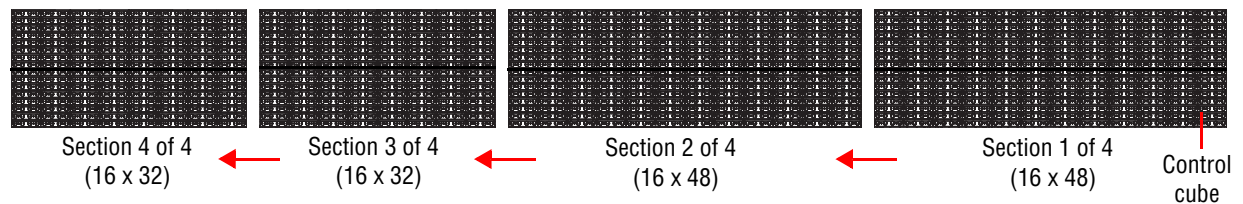
Multiple section signs are assembled as follows:

NOTE: Always begin numbering from the section with the control cube to the left, as viewed from the front of the sign.
See "Identifier label" on page 12 for more information.

Example of a one-line, 7 x 160 size sign:



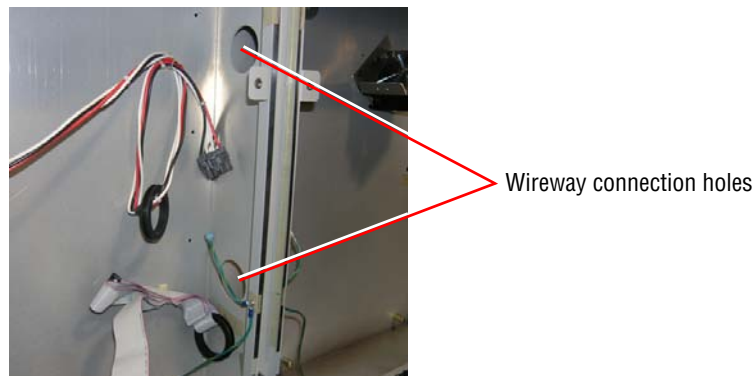
Example of a two-line, 16 x 160 size sign:



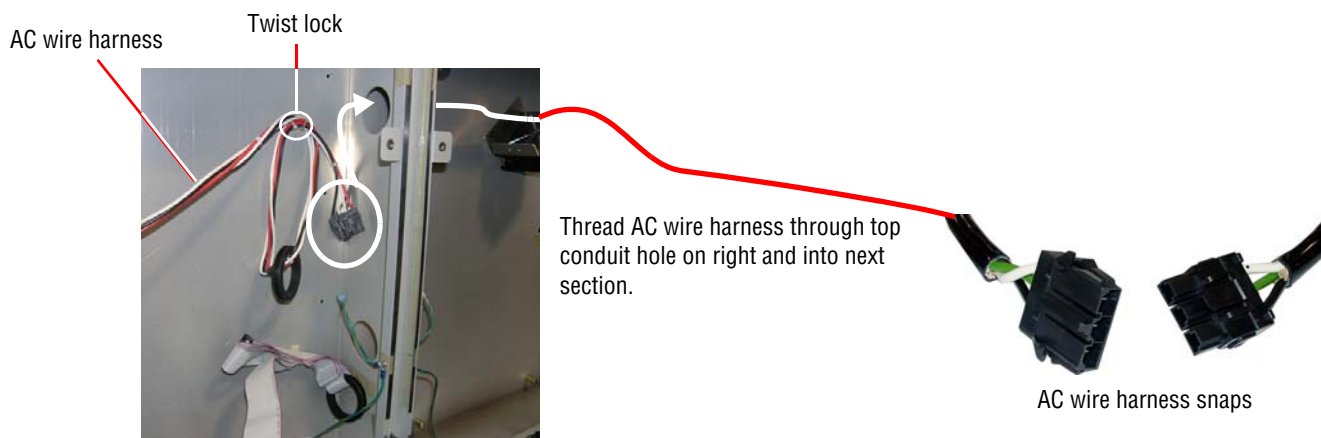
1. Prior to mounting each section to a superstructure able to support the sign section weights, read the identifier label on each sign section to determine section location. See "Identifier label" on page 12. Make sure the sign sections are mounted flush and level with one another.
2. Remove power from the sign. See "Internal view" on page 8 for location of the power switches. *Note that on a two-line sign, both switches must be in the off position to remove power from the sign.*



3. Open the sign sections. See "How to open a section door" on page 35.
4. Remove the stickers covering the wireway connection holes.



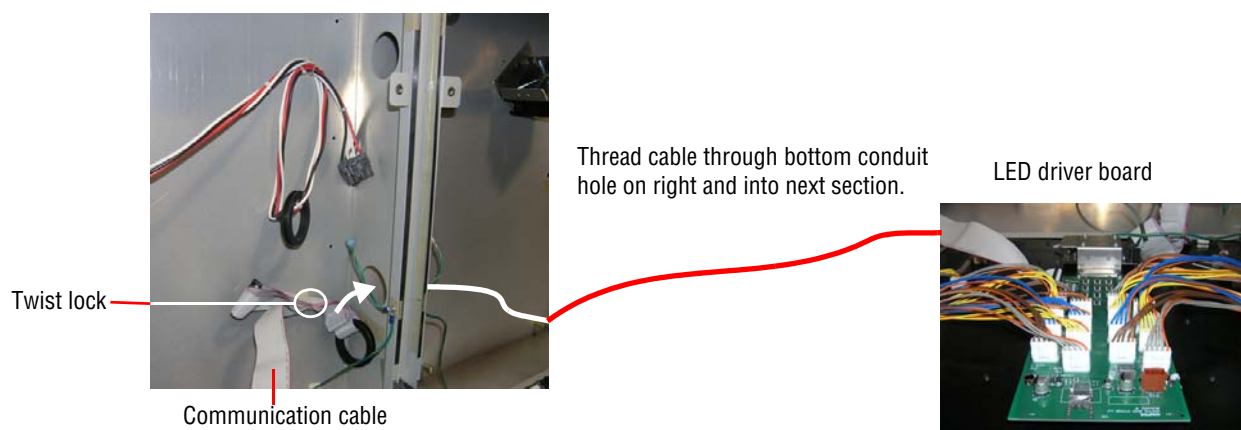
5. Starting with the left-most section, unclip the twist lock securing the AC wire harness. Thread the AC wire harness through the top wireway connection hole on the right and snap it into the next section's wireway harness. Repeat for all sections as necessary:



6. Affix the grommet to the top wireway connection hole.



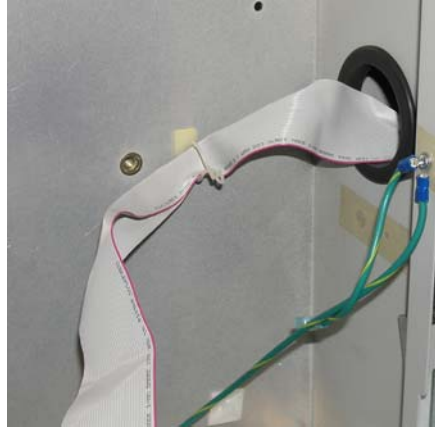
7. Starting with the left-most section, unclip the twist lock securing the communication cable. Thread the communication cable (red-lined edge up) through the bottom wireway connection hole on the right and attach it to the next section's LED driver board. Repeat for all sections as necessary:



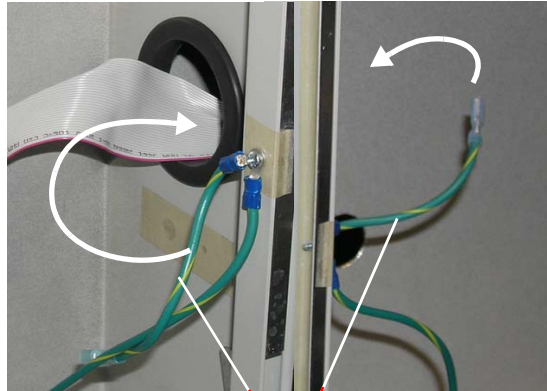
8. Affix the grommet to the bottom wireway connection hole.



Grommet



9. Starting with the left-most section, thread the ground wire through the bottom wireway connection hole on the right and snap it into the next section's ground wire. Repeat for all sections.



Ground wires

Thread the ground wire through bottom conduit hole on right and into next section.

Temperature probe mounting (optional)

When properly installed, the temperature probe will indicate accurate temperature. The best location for the temperature probe is on the display or the display structure.

NOTE: Using the supplied 25-foot temperature probe cable (pn 7122-0401, 22 AWG), there is a maximum distance of 250 feet between the temperature probe and the sign. However, you can extend distance and potentially find a better mounting location by changing the cable gauge. Contact Technical Support for more information.

For two or more signs connected as Master/Secondary Master or Master/Slave, the temperature probe can be connected to either sign.

Do

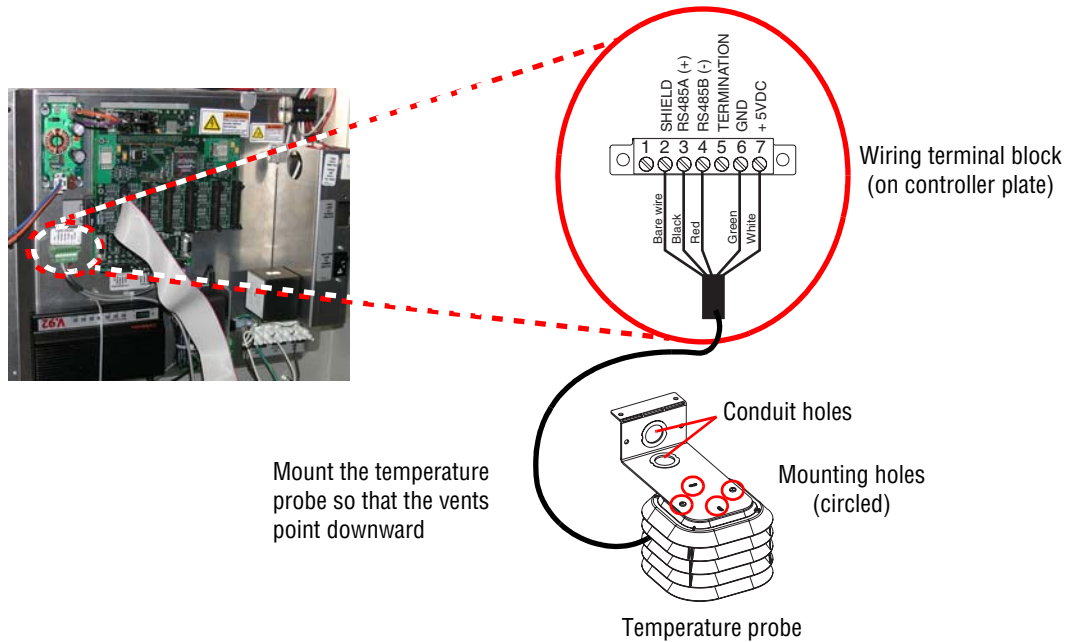
- Choose a location with the following criteria:
 - Air movement is not restricted by nearby walls or other obstructions.
 - The mounting background is light-colored and not dark-colored.
 - The location is above vegetation and not above asphalt or blacktop.
 - The location is on the north side of a building to provide protection from the sun.
- Shield the probe from the effect of the direct sun, reflected heat, or any nearby sources of heat, such as chimneys, lamps, vents, or HVAC ducts.
- If the temperature probe will be mounted to a heat-conducting surface, like metal, prevent the temperature probe's case from conducting heat from this surface by placing a non-heat conducting material, like a wood board, between the surface and the probe.
- Mount the temperature probe at least 6 feet off the ground.
- Mount the temperature probe at least one foot below the eave of a protected overhang so convection currents (rising hot air flow) are not trapped around the temperature probe. Also, make sure convection currents are not blocked by the mounting plates.
- Mount the probe so that the vents face downward.
- Hand-tighten the mounting screws so as not to strip them.

Do not

- Mount the temperature probe along the top of the sign.
- Mount the temperature probe near sprinklers and water fountains.
- Run the temperature probe cable and the sign's power wires through the same conduit.

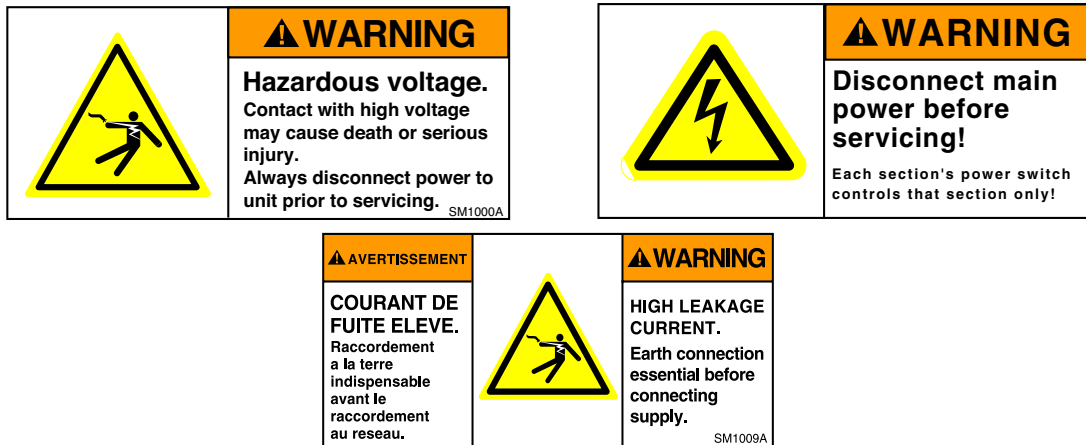
Installation

1. Mount the temperature probe with the vents pointing downward using the mounting holes OR the conduit holes on the bracket.
2. Run the temperature probe to the appropriate terminal block in the control cube.
NOTE: The temperature probe cable and the sign's power wires must be run in different conduits.
3. Connect the temperature probe cable to the wireway terminal block as shown below.



Electrical installation

Electrical installation must only be attempted by a qualified electrician. Electrical connection must comply with all applicable national and local codes.



Guidelines for electrical installation

- On a two-line sign, both power switches must be in the off position to remove power from the sign. See “Internal view” on page 8 for location of the power switches.
- Inspect all internal sign cabling for proper connection and seating.
- All power wiring must be from circuit breaker-protected lines.
- A two-pole disconnect device must be installed in the building wiring for each branch circuit supplying the sign.
- The sign must be properly grounded according to the applicable codes (for example, NEC Article 250 and 600, and IEEE 1100-1999).
- Run separate conduits for signal wires (for example, RS232, RS485) and for power wires. However, fiber optic wire may be run in the same conduit with power wires.
- All electrical connections must be watertight.
- Use minimum 80° C copper wire only.
Utiliser uniquement un fil en cuivre pouvant supporter 80° C minimum.
- Torque terminals to a minimum of 7 in/lbs and a maximum of 10 in/lbs.
Serrer les bornes à 0,79 N/m minimum, mais pas à plus de 1,13 N/m.

Run power to the sign

1. Run power to the sign using waterproof conduit.
 - DO drill holes for power entry at the back of the control cube where indicated by a label.
 - DO NOT drill additional conduit holes in the right side of the sign. The wiring will interfere with the door hinge.
 - DO NOT drill additional conduit holes through the controller plate in the control cube.
 - DO NOT drill additional conduit holes along the bottom of the cube, note that water may pool there.
 - DO NOT route power and communication wires out of the cube door and around the side of the sign; the wires will be damaged when the door is closed.
 - DO NOT route power and communication wires in the same conduit (*unless the communication wires are fiber optic*).

Adaptive Explains

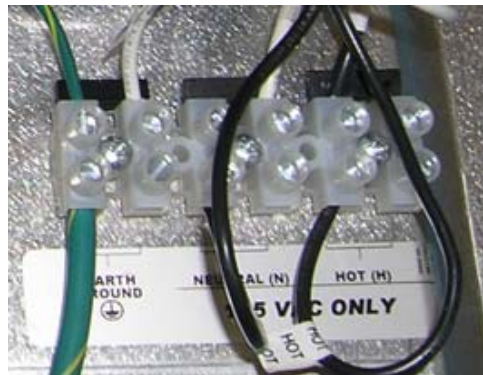
Why is it necessary to always run *two* conduits to a sign?

It is *not* always necessary. Two conduits are only necessary when communication wire, like RS485 wire, is run to a sign from a computer or from another sign. In these cases, one conduit would contain the sign's power wires and the other conduit the communication wires.

If power and communication wires are put in the same conduit, there is a chance the communication wires might pick up electrical interference from the power wires. For example, when a live power cord is placed next to a stereo speaker wire, the interference from this cord may cause the speaker to hum. In the case of a sign, this same effect could disrupt messages sent to the display.

On the other hand, *fiber optic cable* and power wires can share the same conduit because fiber optic cable is immune to electrical interference.

2. Connect each power circuit to the appropriate wireway power terminal on the controller plate (example below):



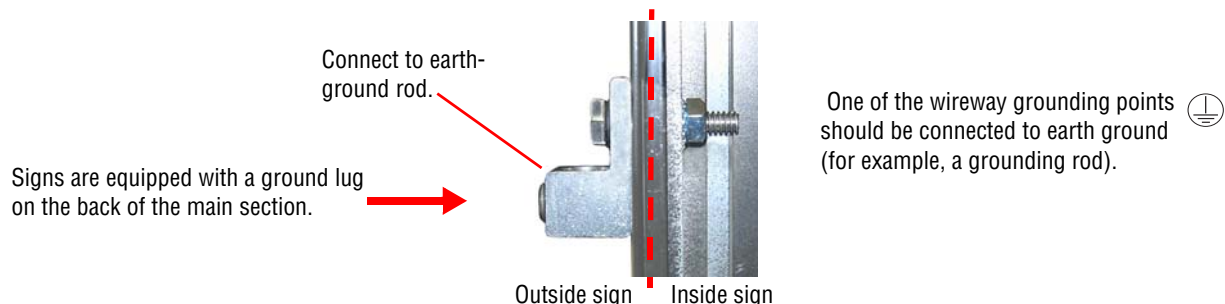
Ground the sign

The sign must be properly grounded in order to provide three types of protection:

- Ground fault protection (see page 23) — The sign must be wired to provide a permanent, low impedance pathway to carry sign ground fault current. This is necessary in order to quickly clear a sign ground fault by opening the power circuit to the sign.

Earth grounding a sign through some type of ground rod bonded to the sign is not sufficient ground fault protection.

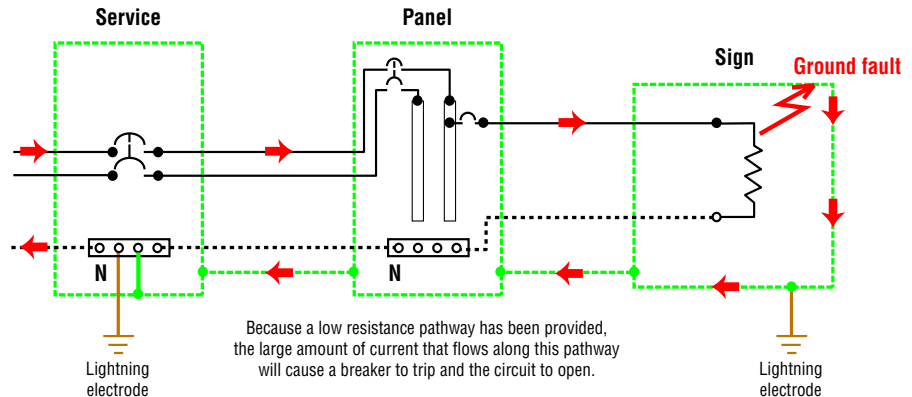
- Lightning strike protection (see page 24) — A sign must be earth grounded either through an existing ground rod or separate ground rod(s) bonded to the sign (see NEC article 250.32).
- Electronic equipment protection (see page 24) — An improperly wired sign could radiate electromagnetic fields (EMF) that may damage or interfere with electronic equipment in or near the sign (see NEC Article 250.6).



Ground fault protection

Sign with Ground Fault Protection

➔ = ground fault current path



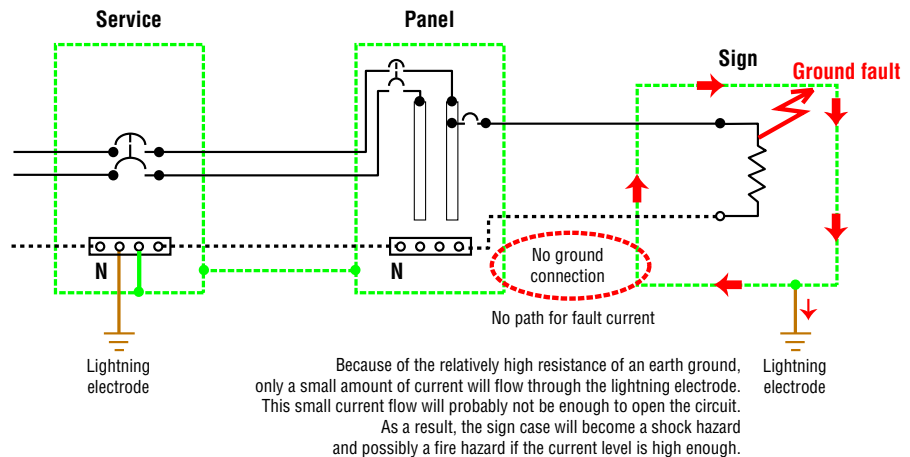
A “ground fault” protected circuit is different from a “ground fault interrupt” protected circuit.

A sign *should* be ground fault protected as shown.

However, a sign *should not* be connected to a ground fault interrupt (GFI) protected circuit.

Sign without Ground Fault Protection

➔ = ground fault current path



Adaptive Explains

What is a ground fault?

It's when a “hot” wire *unintentionally* makes contact with metal, like an electrical outlet box or the case of a sign. If a sign is wired properly, a circuit breaker will trip (or “open”) because too much electrical current is flowing. The ground fault will have to be corrected before the circuit breaker can be closed.

How do you protect against ground faults?

Provide a ground fault current path with so *little* resistance (basically just the resistance of the power wires) that a *huge* amount of current tries to flow. For example, imagine a sign is powered by 120V and is connected to a 20 ampere circuit. If this sign tries to draw more than 20 amps of current, the circuit breaker will trip and the circuit will open. Let's say that this sign is 300 feet away from its power source and that the total resistance of this wire is 0.4 ohms. Using Ohm's Law, the fault current = 120V divided by 0.4 ohms = 300 amps! This amount of current will cause the circuit breaker to open very quickly — removing the shock threat.

Why can't lightning rods be used to protect against ground faults?

A lightning rod (or earth ground) may have too *much* resistance and so not enough current will flow through it to cause a circuit breaker to open. For example, imagine an earth ground has a resistance of 10 ohms, which is low. Using Ohm's Law again, the fault current = 120V divided by 10 ohms = 12 amps. This is not enough current to cause the 20 amp circuit breaker to open. This means the ground fault would not be cleared and dangerous levels of current would be present on the sign's case *and* near the ground rod itself.

Lightning strike protection

A sign bonded to an earth ground has a means of dissipating the high voltage and current from a lightning strike. The resistance of the grounding electrode must be as low as possible. However, damage can still occur to a sign's electronic equipment from lightning voltage transients.

Though some surge protection is incorporated into a sign, to protect a sign from high-voltage lightning transients, surge protectors need to be installed at the panelboards (see NEC Article 280 and 284).

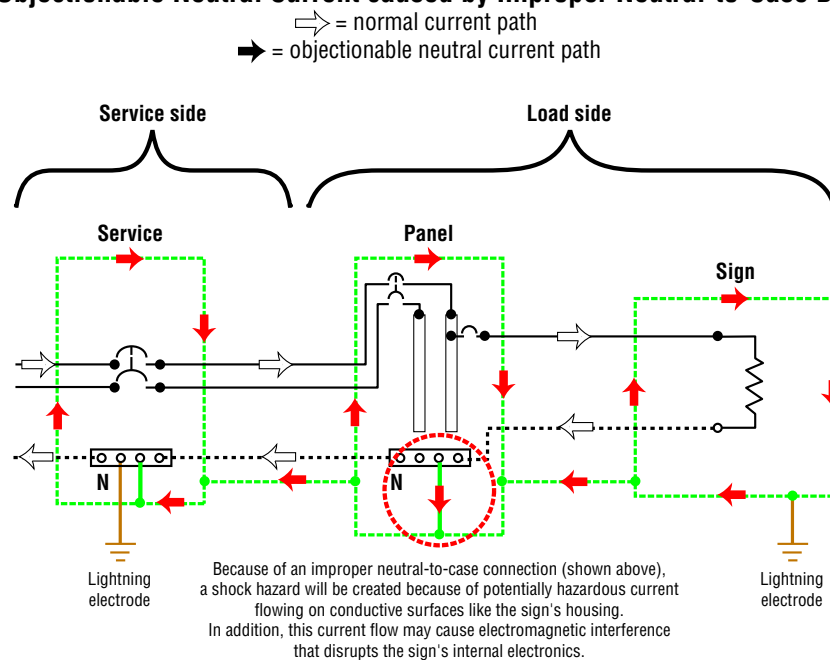
Electronic equipment protection

A common cause for the failure of sensitive electronic equipment is the presence of objectionable current (also called objectionable neutral current) on grounding and bonding paths.

Objectionable neutral current can be caused by:

- Errors in installation wiring
- Improper neutral-to-case bonds (illustrated below)

Objectionable Neutral Current caused by Improper Neutral-to-Case Bond



- Equipment-grounding conductor used to carry neutral current — This situation arises when no separate grounding wire is present when connecting power to a sign. NEC Article 250.32(B)(2) *does* permit a neutral-ground bond to be used in a separate structure if all of the following three conditions are met:
 - (1) an equipment grounding conductor is not run with the supply to the structure
 - (2) there are no continuous metallic paths bonded to the grounding system in both structures involved
 - (3) equipment ground-fault protection has not been installed on the common AC service

Adaptive does not recommend using the equipment-grounding conductor to carry neutral current as permitted by NEC 250.32(B)(2) because it creates a potentially hazardous situation. For example, a future installer might connect cabling between the two structures and this could create a dangerous parallel current path.

Adaptive Explains

How can you tell if objectionable neutral current is present?

A microohm multimeter can be used to measure the voltage difference between the neutral and ground conductors. Though a difference of 0V is ideal, the voltage difference should not exceed 0.5V.

Networking

Up to four AlphaEclipse RoadStar signs can be connected together into a network (see “Sign-to-sign connections” on page 25).

Also, in order to display messages, a sign must be connected to a computer that is running AlphaNET software (see “Computer-to-sign connections” on page 28).

Sign-to-sign connections

Two or more signs can be set up as either

- Master/Secondary Master (page 26) — two to four signs that can display a different message. While the same message could be sent to both signs, the messages may not appear at *exactly* the same time. Signs connected as Master/Secondary Master require a temperature probe be connected to *just* the Master sign in order to display the temperature on both.
- Master/Slave signs (page 27) — all these signs display *the same message at the same time*. In this setup, one sign is configured as the Master and all the others as Slave signs.

Adaptive Explains

Does it matter if signs are set up as Master/Secondary Master or Master/Slave?

The most important difference between Master/Secondary Master and Master/Slave signs is that Master/Slave signs *all* display *the same message at the exact same time*. On the other hand, signs configured as Master/Secondary Master allow you to display a *different* message on each of the signs.

How are signs set up to be Master/Secondary Master or Master/Slave?

Signs are configured at the factory. Master/Secondary Master is normally the factory default.

Is there any way to tell if a sign is a Master, a Secondary Master, or a Slave sign by just looking at it?

Probably not without turning the sign off and then on again. When you do this, the word “Master”, “Sec-Master” or “Slave” will appear in the sign’s startup messages.

Also, there is a label on the back of the sign that indicates how the sign is configured.

Master/Secondary Master sign wiring

Overview

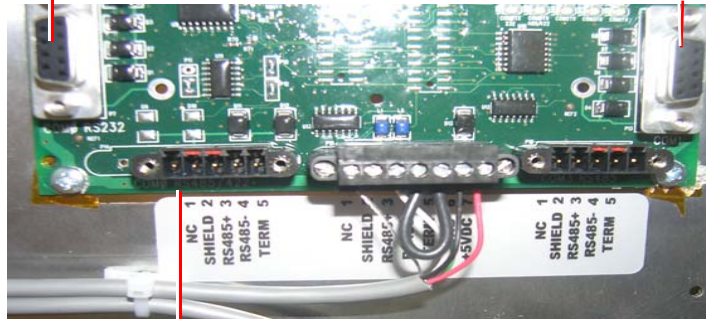
Signs connected as Master/Secondary Master can each display a unique message, unlike Master/Slave signs where all signs always display the same message at the same time. In a Master/Secondary Master sign pair, a message can be displayed on Master sign #1 by sending the message to serial address 1, or displayed on Secondary Master sign #2 by sending the message to serial address 2. Also, a message can be displayed on all Master signs by broadcasting the message to serial address 0.

The wiring is connected between each sign's controller board and the terminal block located on the controller plate:

The controller board and wiring terminal block are located on the controller plate in the control cube. See "Internal view" on page 8.



Wiring terminal block

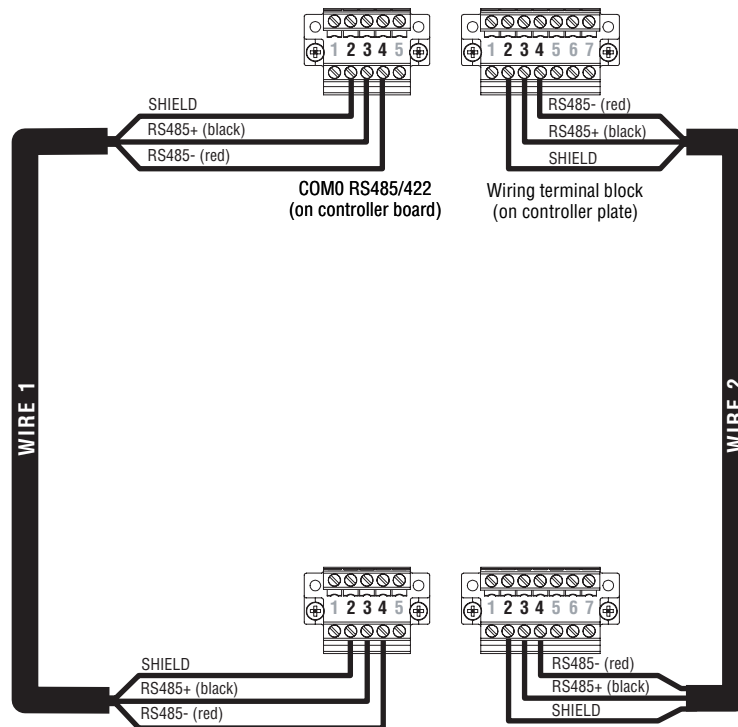


Controller board

COM0 RS485/422

Wiring

Master sign #1 – Serial address 1



Secondary Master sign #2 – Serial address 2

For 3 or more signs, connect another wire from here to COM0 RS485/422 in the next sign.

For 3 or more signs, connect another wire from here to the wiring terminal block in the next sign.

Master/Slave sign wiring

Overview

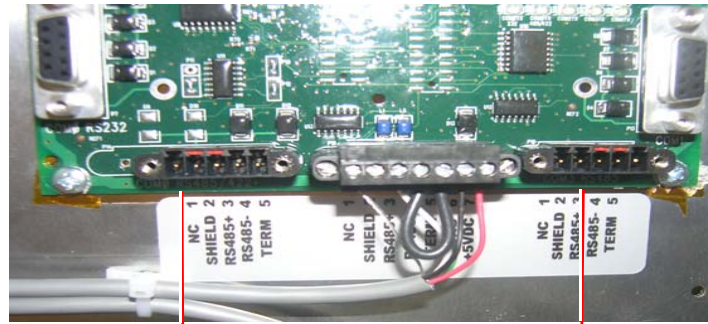
Signs connected as Master/Slave always display the same message at the same time, unlike Master/Secondary Master signs where unique messages can be displayed on each sign. For Master/Slave signs, all messages should be sent to either serial address 0 or to all of the sign's addresses (in the example below, address 1 and 2).

The wiring is connected between each sign's controller board and the terminal block located on the controller plate:

The controller board and wiring terminal block are located on the controller plate in the control cube. See "Internal view" on page 8.



Wiring terminal block



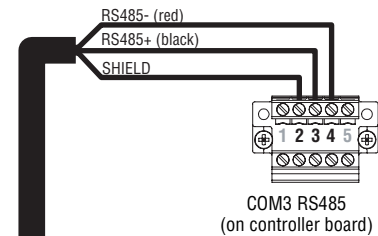
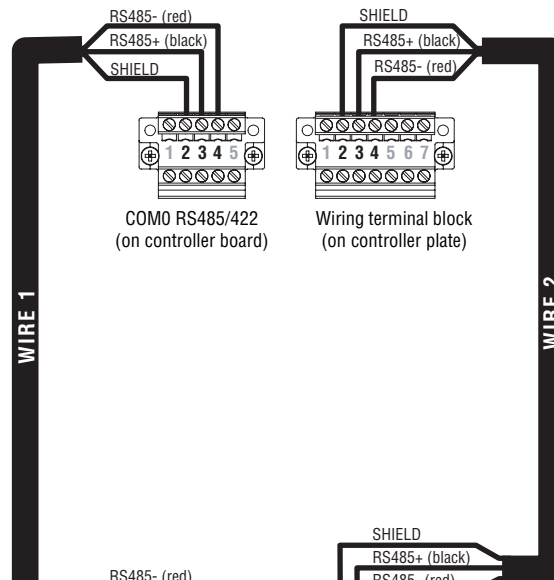
COM0 RS485/422

Controller board

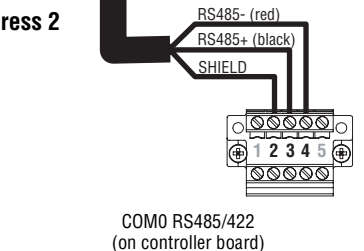
COM3 RS485

Wiring

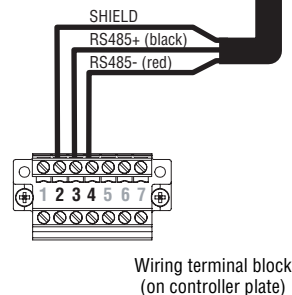
Master sign #1 – Serial address 1



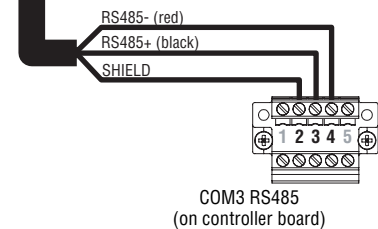
Slave sign #2 – Serial address 2



For 3 or more signs, connect another wire from here to COM0 RS485/422 in the next sign.



For 3 or more signs, connect another wire from here to the wiring terminal block in the next sign.



For 3 or more signs, connect another wire from here to COM3 RS485 in the next sign.

Computer-to-sign connections

In order to display messages, a sign must be connected to a computer that is running AlphaNET software. (This computer is referred to as the “messaging computer”.)

There are a number of ways to connect the messaging computer to a sign:

- RS485 wire (page 29) — using RS485 plenum wire (pn 7124-0203), a sign can be wired to a computer that could be up to 4000 feet away from the sign.

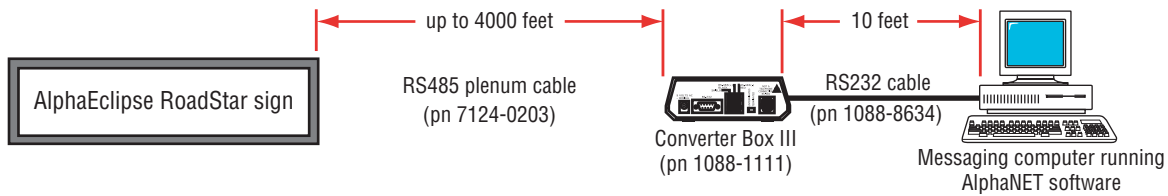
Ordinary wire, phone wire, CAT 5 wire, and so on must NOT be used in place of Adaptive’s RS485 plenum wire.

- Modem (page 30) — by placing a modem inside a sign (factory installed) and attaching another modem to the messaging computer, messages are sent to a sign through ordinary phone lines.
- Fiber optic (page 31) — using a fiber optic mini-modem inside a sign (factory installed) and another mini-modem connected to the messaging computer, a sign can be connected to a computer that could be up to 2 miles away from the sign. Fiber optic cable is immune to electrical interference so the cable can be placed in the same conduit as the power wires.
- Wireless transceiver (page 32) — for this option, one wireless transceiver is placed inside the sign (called the “Receive” unit which is factory installed) and another transceiver (called the “Master”) is connected to the messaging computer. Wireless transceivers can connect to a sign up to 2 miles away. (Actual distance can vary greatly depending on the local environment, obstructions, electrical interference, and so on.)

RS485 wire computer-to-sign connection

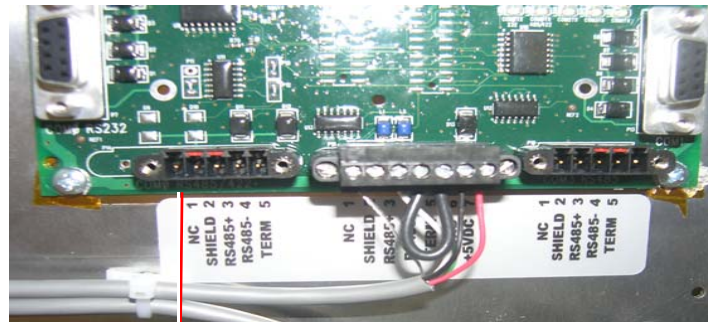
Overview

In order to display messages on a sign, the messaging computer must be connected to the sign, such as with a Converter Box III.



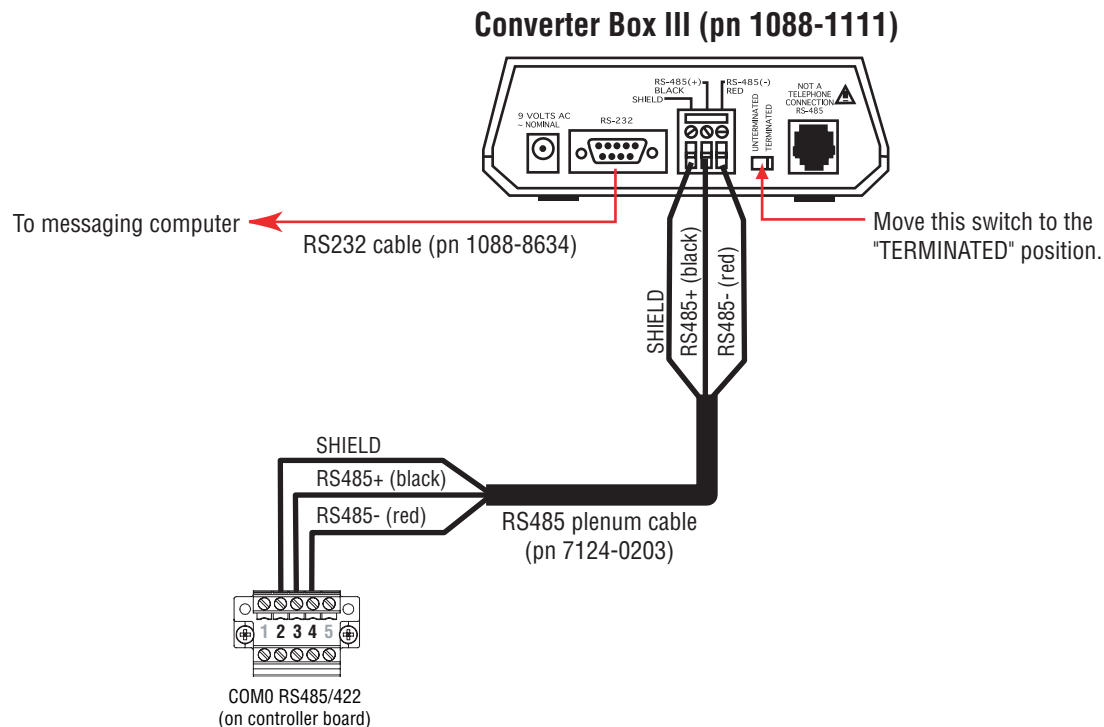
The wiring is connected from the controller board to the converter box:

The controller board is located on the controller plate in the control cube. See "Internal view" on page 8.



COM0 RS485/422

Wiring

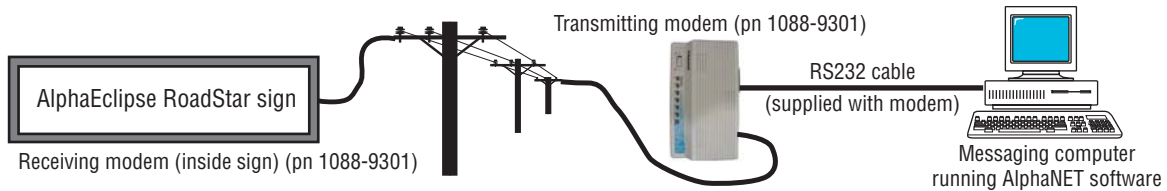


Modem computer-to-sign connection

Overview

In order to display messages on a sign, the messaging computer must be connected to the sign, such as with a pair of telephone modems (a Transmitting modem attached to the messaging computer and a Receiving modem attached to a sign).

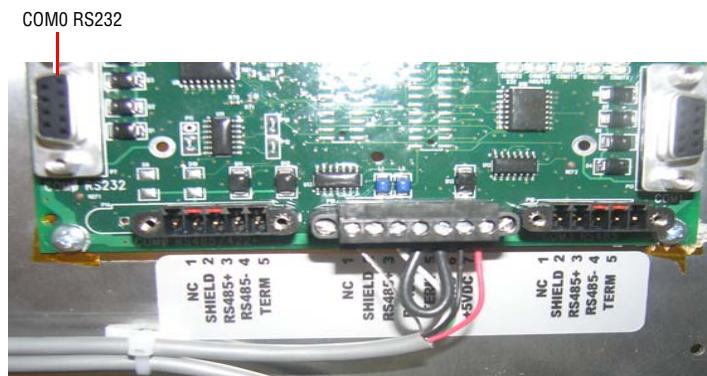
Modems can connect to a sign that is almost anywhere. However, a sign must have its own phone line.



The wiring is connected from the controller board and the surge suppressor board to the modem:

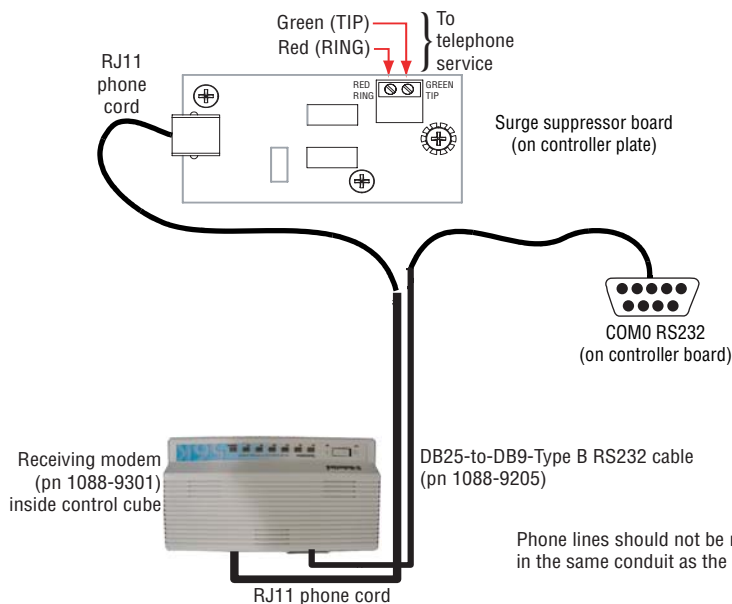
The controller board is located on the controller plate in the control cube. See "Internal view" on page 8.

Note: The surge suppressor board is also located on the controller plate immediately to the right of the modem.



Controller board

Wiring



Modem DIP switch settings:



- Switch #1 = ON (Modem ignores DTR)
- Switch #3 = ON (Display result codes)
- Switch #4 = ON (Do not echo offline commands)
- Switch #8 = ON (Recognize AT commands)

Modem AT command setup string:

AT&H0&R1&B1&N6&Y0&W0

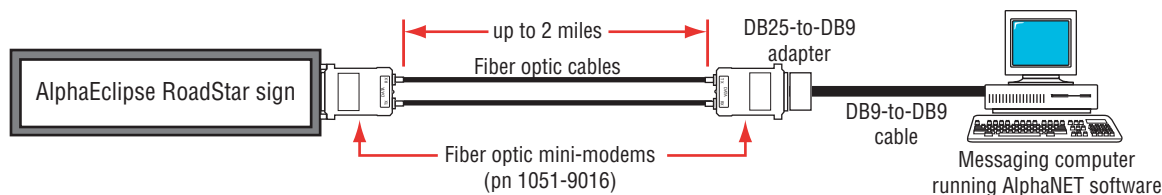
Phone lines should not be run in the same conduit as the power lines.

Fiber optic computer-to-sign connection

Overview

In order to display messages on a sign, the messaging computer must be connected to the sign, such as with fiber optic modems.

Fiber optic modems allow the messaging computer to connect to a sign up to 2 miles away from the computer. The fiber optic modems send data over an optical RS232 connection.



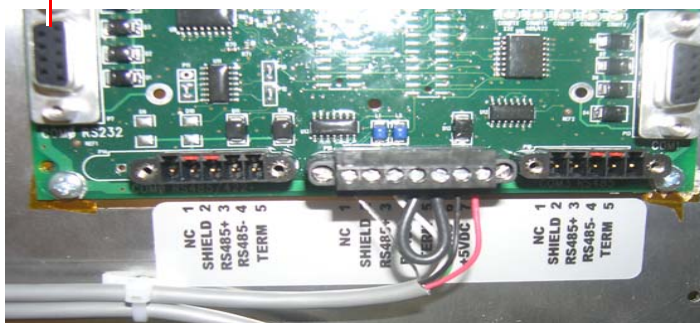
The wiring is connected from the controller board and the regulator board to the fiber optic mini modem:

The controller board and the regulator board are located on the controller plate in the control cube. See "Internal view" on page 8.



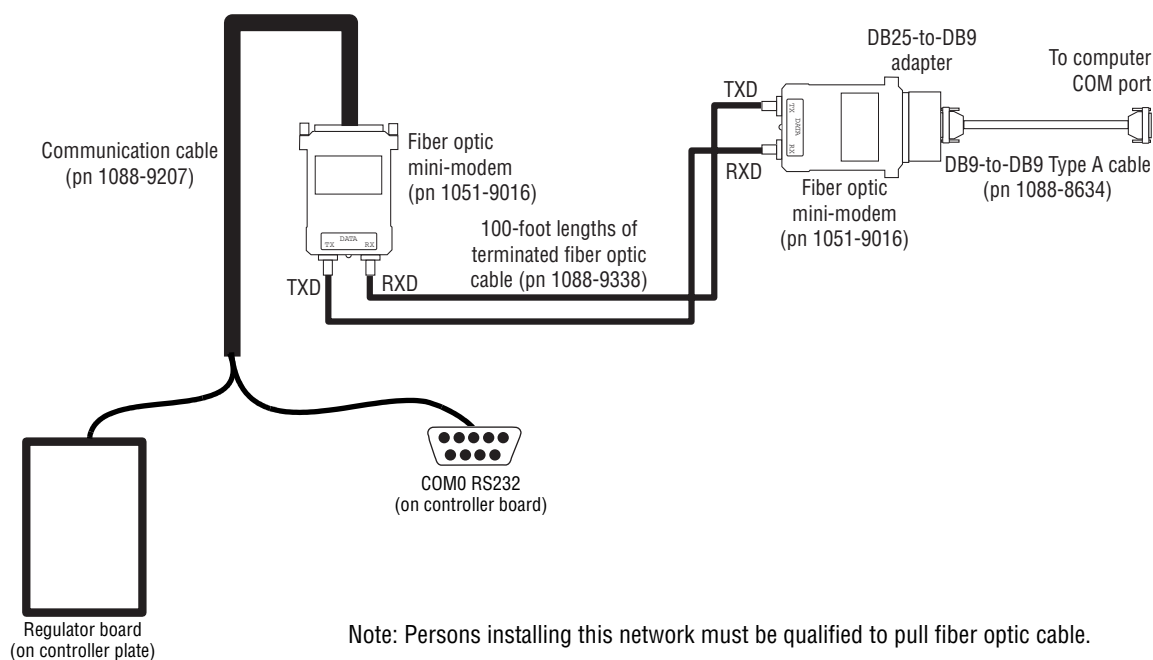
Regulator board

COM0 RS232



Controller board

Wiring



Note: Persons installing this network must be qualified to pull fiber optic cable.

Wireless transceiver computer-to-sign connection (Locus)

Overview

In order to display messages on a sign, the messaging computer must be connected to the sign, such as with a pair of wireless transceivers (a Master transceiver attached to the messaging computer and a Receive transceiver attached to a sign).

Wireless transceivers can connect to a sign that is up to 2 miles away. (Actual distance depends on the local environment, obstructions, electrical interference, and so on.)



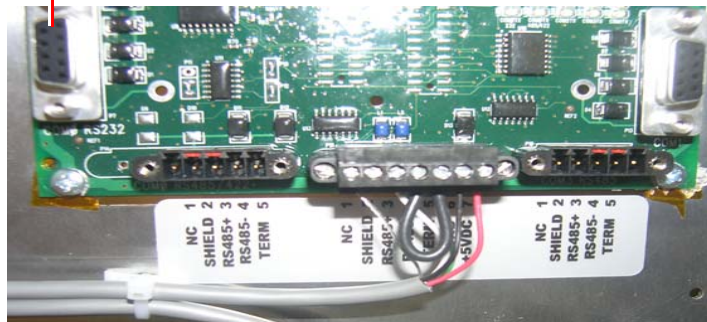
The wiring is connected from the controller board and the regulator board to the transceiver:

The controller board and the regulator board are located on the controller plate in the control cube. See "Internal view" on page 8.



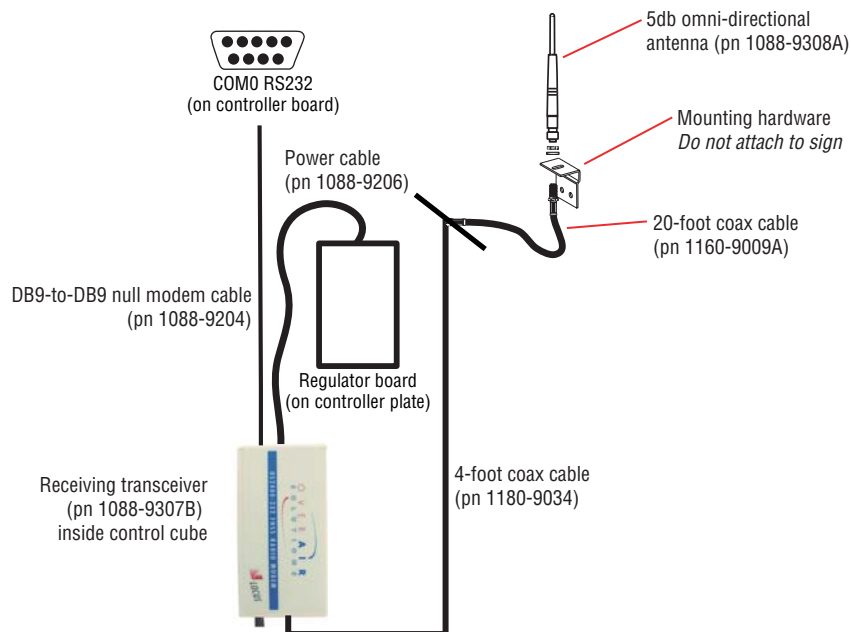
Regulator board

COM0 RS232



Controller board

Wiring



Wireless transceiver computer-to-sign connection (Alpha RF900)

Overview

In order to display messages on a sign, the messaging computer must be connected to the sign, such as with a pair of wireless transceivers (a server transceiver attached to the messaging computer and a client transceiver attached to a sign).

Alpha RF900 transceivers have an indoor transmission range of 300 to 500 feet and an outdoor range of 3500 feet line-of-site.



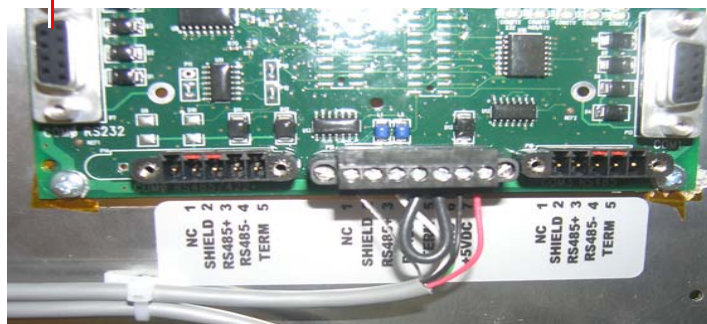
The wiring is connected from the controller board and the regulator board to the transceiver:

The controller board and the regulator board are located on the controller plate in the control cube. See "Internal view" on page 8.



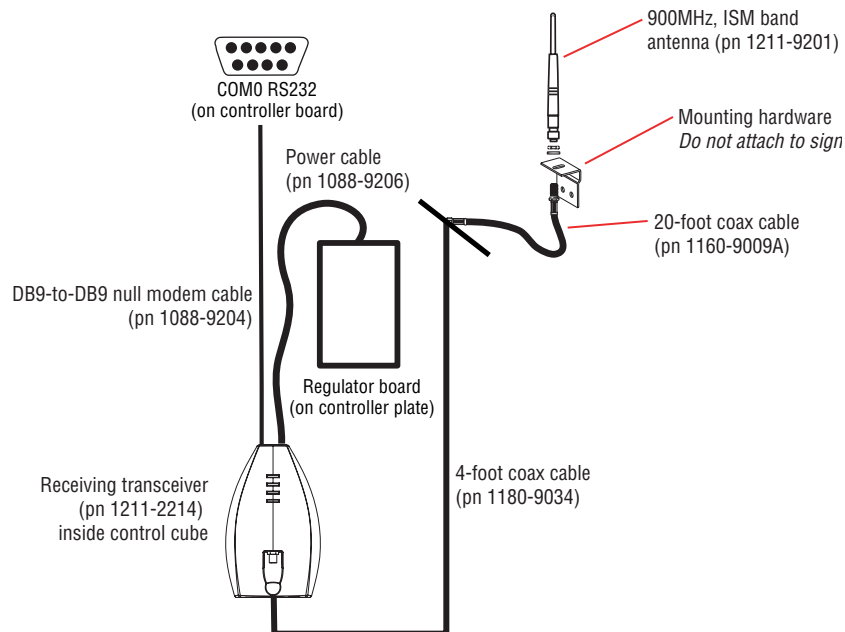
Regulator board

COM0 RS232



Controller board

Wiring



Appendix

Serial address of a sign

The serial address of a sign is a number used to identify one sign from another when messages are sent.

Each AlphaEclipse is factory programmed with a serial address. Though a sign's address can be changed, it is usually not necessary or desirable to do so.

To determine a sign's serial address, do one of the following:

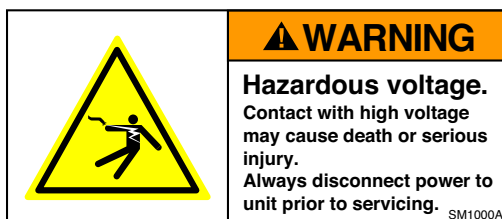
- Remove power to the sign and then reapply power — a series of startup messages will appear on the sign. One of these messages will identify the sign's serial address and another whether a sign is a Master, Secondary Master, or a Slave sign.
- Check the back of the main section of the sign for a label indicating the sign's serial address and whether a sign is a Master, Secondary Master, or a Slave sign:



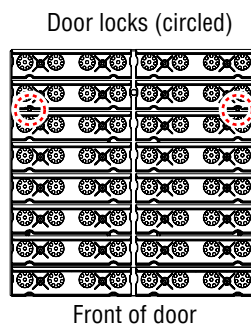
How to open a section door

All AlphaEclipse RoadStar sign sections open from the front:

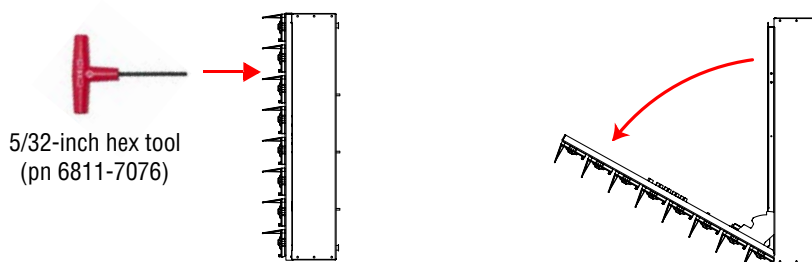
1. Remove power from the sign. See "Internal view" on page 8 for location of the power switches. Note that on a two-line sign, both switches must be in the off position to remove power from the sign.



2. Locate the door locks in each door that is to be removed:



3. Use a 5/32-inch hex tool to open each door lock. Turn counterclockwise to open the latch. Then open the door by pulling it toward you:

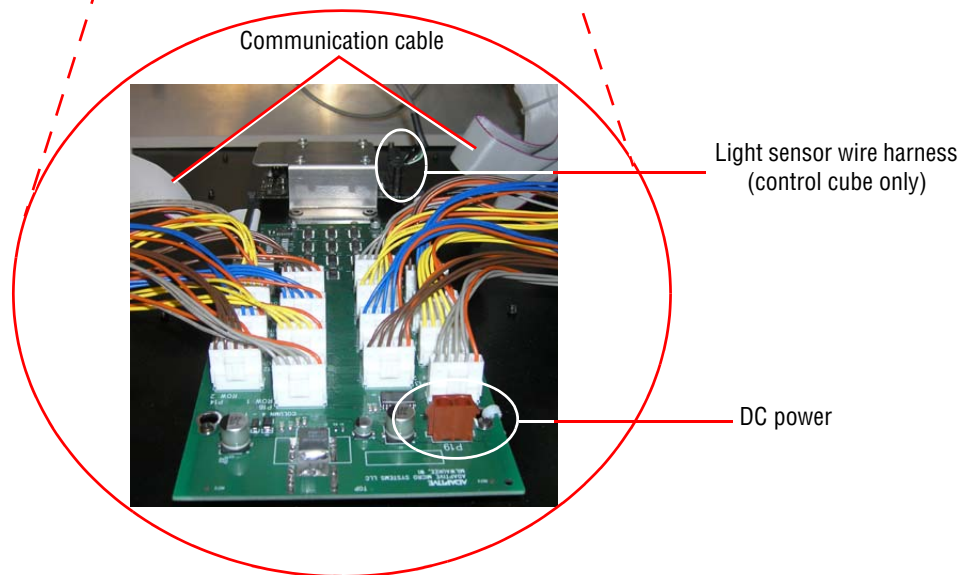
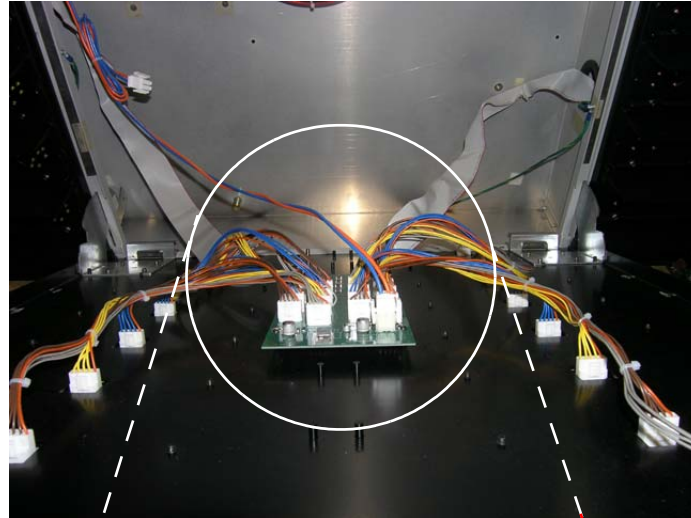


Open the door slowly to prevent damage to internal components.

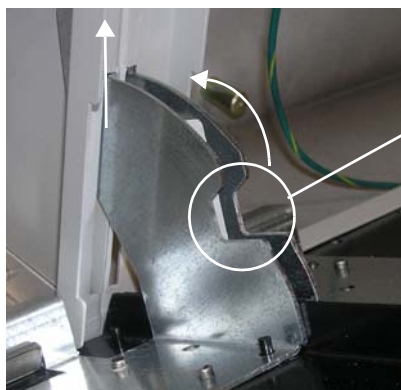
How to remove a section door

A section door *must* be put back into the *same* location from where it was removed.

4. Disconnect the communication cable, DC power, and the light sensor wire harness (control cube only) from the back of the door:



5. Remove the door from the cube.

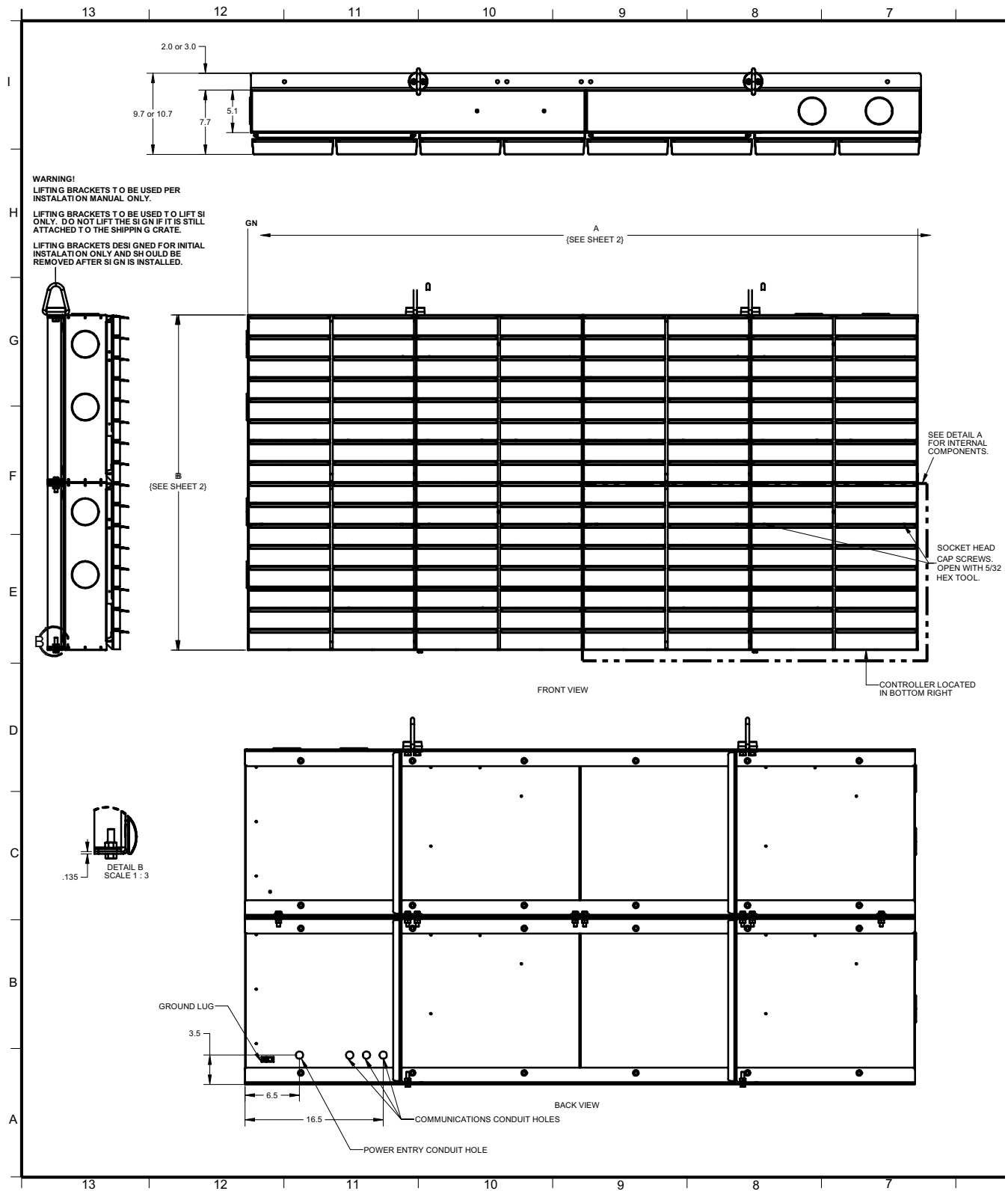


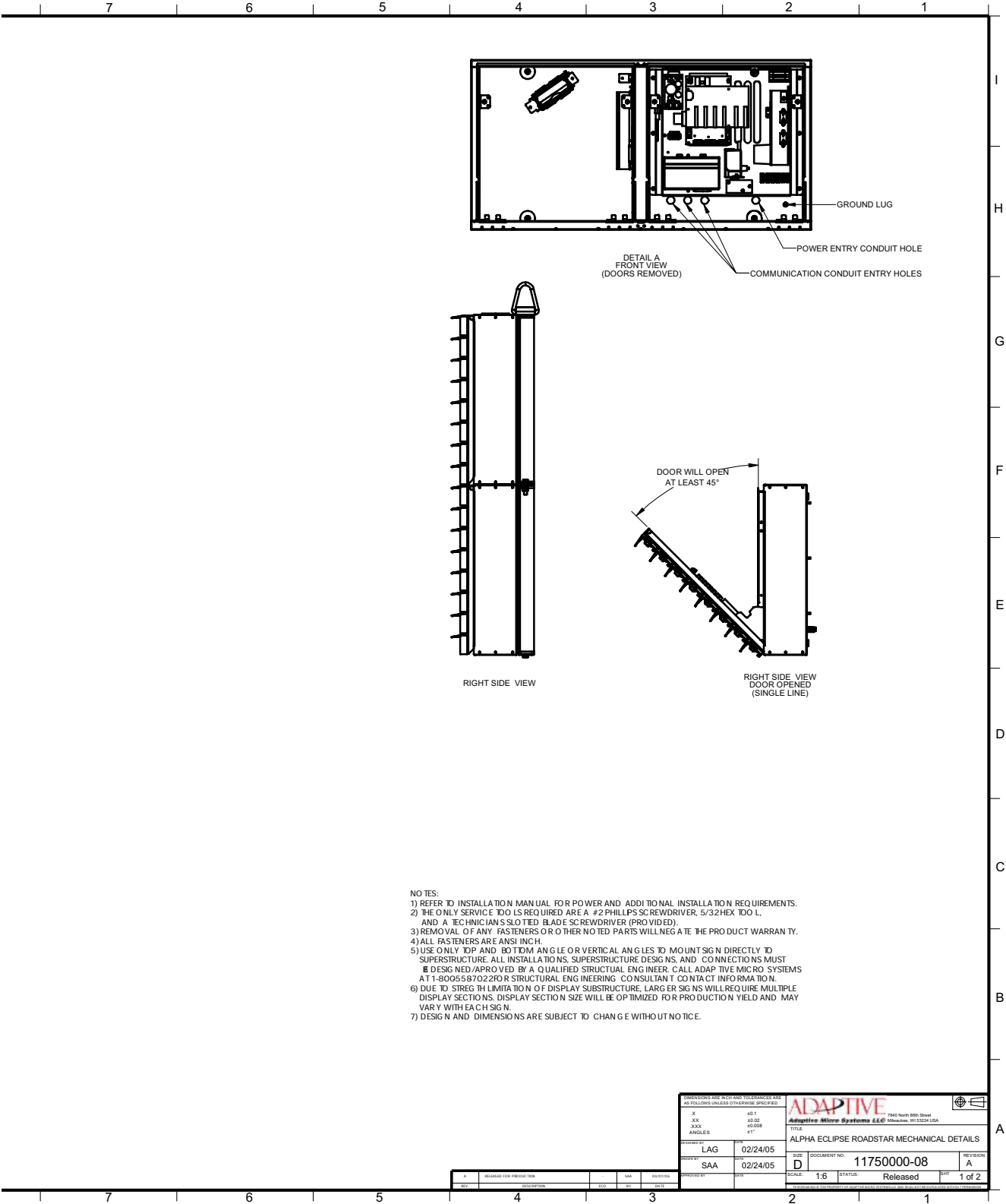
NOTE: Keep fingers clear of hinge notch when opening, removing, or closing door to avoid pinching.

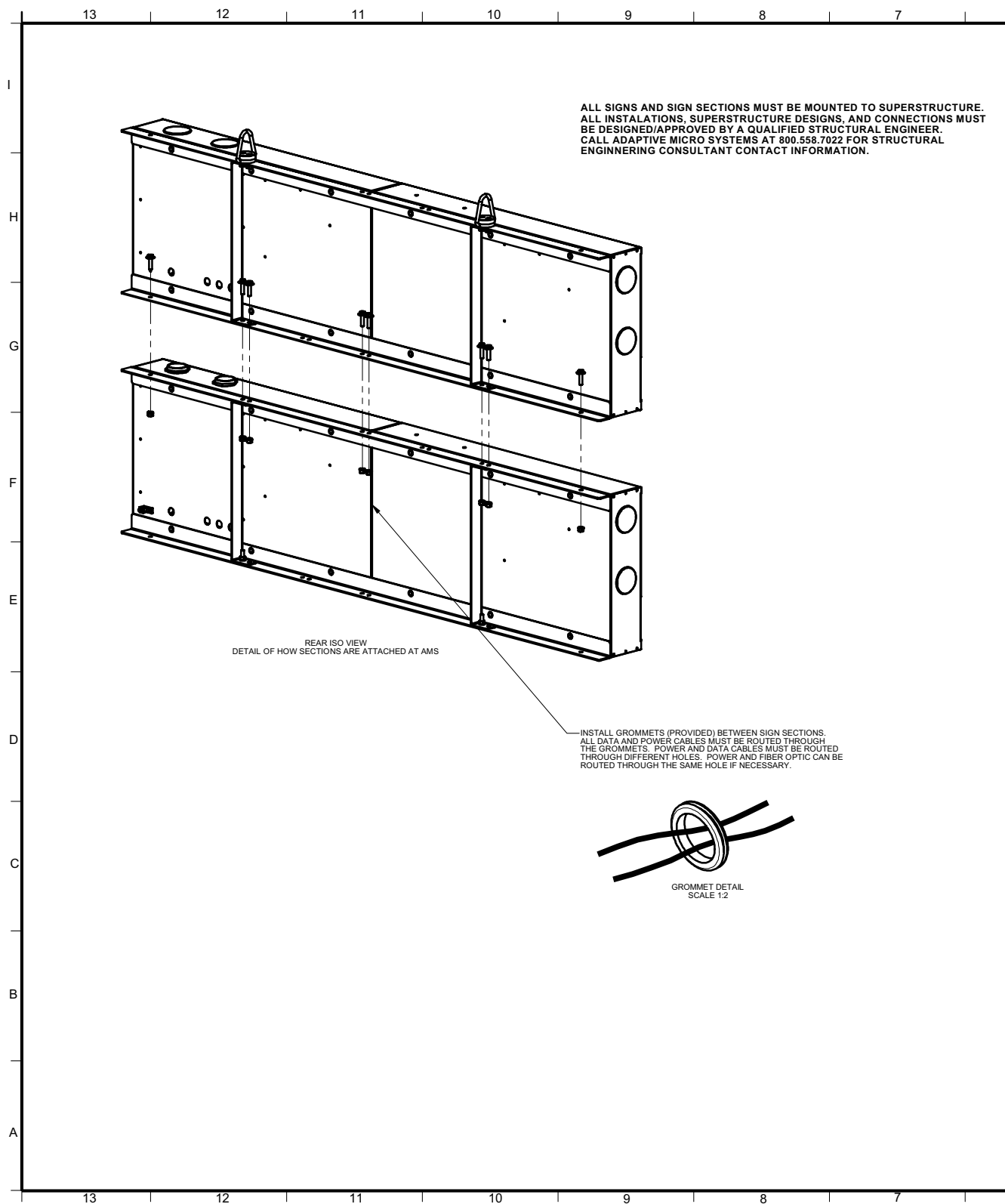
- Rotate the door forward until the hinge notch lines up with the side of the cube.
- Lift the door straight up.
- Rotate the door away from you.
- Pull the door out.

(This page intentionally left blank.)

Assembly drawings







Appendix

Technical specifications

One-line, red, 17.5-inch character

| Model number | Rows | Cols | Pitch (inches) | LED display assembly | LED driver assembly | Power supply | Internal cooling fan | Fan thermostat | On/Off switch | Rated input voltage (volts) | Rated input frequency (HZ) | Rated input current (115V) | Rated input current (230V) | Rated input power (watts) | Width x Height x Depth (inches) | Watt density (approximate) (watts per cubic foot) | Weight (nearest 10 pound increment) |
|-------------------|------|------|----------------|----------------------|---------------------|--------------|----------------------|----------------|---------------|-----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------------|--|--|
| RS6401-07x032-RED | 7 | 32 | 2.5 | 56 | 4 | 2 | 2 | 2 | 1 | 115 - 230 | 50/60 | 2.86 | 1.49 | 329.23 | 80x20x10.0 | 64.6 | 110 |
| RS6401-07x048-RED | 7 | 48 | 2.5 | 84 | 6 | 3 | 3 | 2 | 1 | 115 - 230 | 50/60 | 4.08 | 2.12 | 469.20 | 120x20x10.0 | 61.4 | 160 |
| RS6401-07x064-RED | 7 | 64 | 2.5 | 112 | 8 | 4 | 4 | 2 | 1 | 115 - 230 | 50/60 | 5.30 | 2.75 | 609.17 | 160x20x10.0 | 59.8 | 210 |
| RS6401-07x080-RED | 7 | 80 | 2.5 | 140 | 10 | 5 | 5 | 2 | 1 | 115 - 230 | 50/60 | 6.51 | 3.39 | 749.14 | 200x20x10.0 | 58.8 | 260 |
| RS6401-07x096-RED | 7 | 96 | 2.5 | 168 | 12 | 6 | 6 | 2 | 1 | 115 - 230 | 50/60 | 7.73 | 4.02 | 889.11 | 240x20x10.0 | 58.2 | 310 |
| RS6401-07x112-RED | 7 | 112 | 2.5 | 196 | 14 | 7 | 7 | 2 | 1 | 115 - 230 | 50/60 | 8.95 | 4.66 | 1029.09 | 280x20x10.0 | 57.7 | 360 |
| RS6401-07x128-RED | 7 | 128 | 2.5 | 224 | 16 | 8 | 8 | 2 | 1 | 115 - 230 | 50/60 | 10.17 | 5.29 | 1169.06 | 320x20x10.0 | 57.4 | 410 |
| RS6401-07x144-RED | 7 | 144 | 2.5 | 252 | 18 | 9 | 9 | 2 | 1 | 115 - 230 | 50/60 | 11.38 | 5.92 | 1309.03 | 360x20x10.0 | 57.1 | 470 |
| RS6401-07x160-RED | 7 | 160 | 2.5 | 280 | 20 | 10 | 10 | 2 | 1 | 115 - 230 | 50/60 | 12.60 | 6.56 | 1449.00 | 400x20x10.0 | 56.9 | 520 |

Two-line, red, 17.5-inch character

| Model number | Rows | Cols | Pitch (inches) | LED display assembly | LED driver assembly | Power supply | Internal cooling fan | Fan thermostat | On/Off switch | Rated input voltage (volts) | Rated input frequency (HZ) | Rated input current (115V) | Rated input current (230V) | Rated input power (watts) | Width x Height x Depth (inches) | Watt density (approximate) (watts per cubic foot) | Weight (nearest 10 pound increment) |
|-------------------|------|------|----------------|----------------------|---------------------|--------------|----------------------|----------------|---------------|-----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------------|--|--|
| RS6401-16x032-RED | 16 | 32 | 2.5 | 128 | 8 | 4 | 4 | 2 | 2 | 115 - 230 | 50/60 | 5.78 | 3.00 | 664.37 | 80x40x10.0 | 65.2 | 230 |
| RS6401-16x048-RED | 16 | 48 | 2.5 | 192 | 12 | 6 | 6 | 2 | 2 | 115 - 230 | 50/60 | 8.45 | 4.39 | 971.91 | 120x40x10.0 | 63.6 | 350 |
| RS6401-16x064-RED | 16 | 64 | 2.5 | 256 | 16 | 8 | 8 | 2 | 2 | 115 - 230 | 50/60 | 11.13 | 5.78 | 1279.46 | 160x40x10.0 | 62.8 | 460 |
| RS6401-16x080-RED | 16 | 80 | 2.5 | 320 | 20 | 10 | 10 | 2 | 2 | 115 - 230 | 50/60 | 13.80 | 7.17 | 1587.00 | 200x40x10.0 | 62.3 | 580 |
| RS6401-16x096-RED | 16 | 96 | 2.5 | 384 | 24 | 12 | 12 | 2 | 2 | 115 - 230 | 50/60 | 16.47 | 8.56 | 1894.54 | 240x40x10.0 | 62.0 | 690 |
| RS6401-16x112-RED | 16 | 112 | 2.5 | 448 | 28 | 14 | 14 | 2 | 2 | 115 - 230 | 50/60 | 19.15 | 9.95 | 2202.09 | 280x40x10.0 | 61.8 | 800 |
| RS6401-16x128-RED | 16 | 128 | 2.5 | 512 | 32 | 16 | 16 | 2 | 2 | 115 - 230 | 50/60 | 21.82 | 11.34 | 2509.63 | 320x40x10.0 | 61.6 | 920 |
| RS6401-16x144-RED | 16 | 144 | 2.5 | 576 | 36 | 18 | 18 | 2 | 2 | 115 - 230 | 50/60 | 24.50 | 12.73 | 2817.17 | 360x40x10.0 | 61.5 | 1030 |
| RS6401-16x160-RED | 16 | 160 | 2.5 | 640 | 40 | 20 | 20 | 2 | 2 | 115 - 230 | 50/60 | 27.17 | 14.12 | 3124.71 | 400x40x10.0 | 61.4 | 1150 |

One-line, amber, 17.5-inch character

| Model number | Rows | Cols | Pitch (inches) | LED display assembly | LED driver assembly | Power supply | Internal cooling fan | Fan thermostat | On/Off switch | Rated input voltage (volts) | Rated input frequency (HZ) | Rated input current (115V) | Rated input current (230V) | Rated input power (watts) | Width x Height x Depth (inches) | Watt density (approximate) (watts per cubic foot) | Weight (nearest 10 pound increment) |
|-------------------|------|------|----------------|----------------------|---------------------|--------------|----------------------|----------------|---------------|-----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------------|--|--|
| RS6401-07x032-AMB | 7 | 32 | 2.5 | 56 | 4 | 2 | 2 | 2 | 1 | 115 - 230 | 50/60 | 4.33 | 2.23 | 497.55 | 80x20x10.0 | 97.7 | 110 |
| RS6401-07x048-AMB | 7 | 48 | 2.5 | 84 | 6 | 3 | 3 | 2 | 1 | 115 - 230 | 50/60 | 6.29 | 3.24 | 723.01 | 120x20x10.0 | 94.6 | 160 |
| RS6401-07x064-AMB | 7 | 64 | 2.5 | 112 | 8 | 4 | 4 | 2 | 1 | 115 - 230 | 50/60 | 8.25 | 4.25 | 948.47 | 160x20x10.0 | 93.1 | 210 |
| RS6401-07x080-AMB | 7 | 80 | 2.5 | 140 | 10 | 5 | 5 | 2 | 1 | 115 - 230 | 50/60 | 10.21 | 5.26 | 1173.93 | 200x20x10.0 | 92.2 | 260 |
| RS6401-07x096-AMB | 7 | 96 | 2.5 | 168 | 12 | 6 | 6 | 2 | 1 | 115 - 230 | 50/60 | 12.17 | 6.27 | 1399.39 | 240x20x10.0 | 91.6 | 310 |
| RS6401-07x112-AMB | 7 | 112 | 2.5 | 196 | 14 | 7 | 7 | 2 | 1 | 115 - 230 | 50/60 | 14.13 | 7.28 | 1624.86 | 280x20x10.0 | 91.2 | 360 |
| RS6401-07x128-AMB | 7 | 128 | 2.5 | 224 | 16 | 8 | 8 | 2 | 1 | 115 - 230 | 50/60 | 16.09 | 8.29 | 1850.32 | 320x20x10.0 | 90.8 | 410 |
| RS6401-07x144-AMB | 7 | 144 | 2.5 | 252 | 18 | 9 | 9 | 2 | 1 | 115 - 230 | 50/60 | 18.05 | 9.30 | 2075.78 | 360x20x10.0 | 90.6 | 470 |
| RS6401-07x160-AMB | 7 | 160 | 2.5 | 280 | 20 | 10 | 10 | 2 | 1 | 115 - 230 | 50/60 | 20.01 | 10.31 | 2301.24 | 400x20x10.0 | 90.4 | 520 |

Two-line, amber, 17.5-inch character

| Model number | Rows | Cols | Pitch (inches) | LED display assembly | LED driver assembly | Power supply | Internal cooling fan | Fan thermostat | On/Off switch | Rated input voltage (volts) | Rated input frequency (HZ) | Rated input current (115V) | Rated input current (230V) | Rated input power (watts) | Width x Height x Depth (inches) | Watt density (approximate) (watts per cubic foot) | Weight (nearest 10 pound increment) |
|-------------------|------|------|----------------|----------------------|---------------------|--------------|----------------------|----------------|---------------|-----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------------|--|--|
| RS6401-16x032-AMB | 16 | 32 | 2.5 | 128 | 8 | 4 | 4 | 2 | 2 | 115 - 230 | 50/60 | 9.16 | 4.71 | 1052.90 | 80x40x10.0 | 103.4 | 230 |
| RS6401-16x048-AMB | 16 | 48 | 2.5 | 192 | 12 | 6 | 6 | 2 | 2 | 115 - 230 | 50/60 | 13.53 | 6.96 | 1556.04 | 120x40x10.0 | 101.9 | 350 |
| RS6401-16x064-AMB | 16 | 64 | 2.5 | 256 | 16 | 8 | 8 | 2 | 2 | 115 - 230 | 50/60 | 17.91 | 9.22 | 2059.18 | 160x40x10.0 | 101.1 | 460 |
| RS6401-16x080-AMB | 16 | 80 | 2.5 | 320 | 20 | 10 | 10 | 2 | 2 | 115 - 230 | 50/60 | 22.28 | 11.47 | 2562.32 | 200x40x10.0 | 100.6 | 580 |
| RS6401-16x096-AMB | 16 | 96 | 2.5 | 384 | 24 | 12 | 12 | 2 | 2 | 115 - 230 | 50/60 | 26.66 | 13.72 | 3065.46 | 240x40x10.0 | 100.3 | 690 |
| RS6401-16x112-AMB | 16 | 112 | 2.5 | 448 | 28 | 14 | 14 | 2 | 2 | 115 - 230 | 50/60 | 31.03 | 15.97 | 3568.61 | 280x40x10.0 | 100.1 | 800 |
| RS6401-16x128-AMB | 16 | 128 | 2.5 | 512 | 32 | 16 | 16 | 2 | 2 | 115 - 230 | 50/60 | 35.41 | 18.22 | 4071.75 | 320x40x10.0 | 99.9 | 920 |
| RS6401-16x144-AMB | 16 | 144 | 2.5 | 576 | 36 | 18 | 18 | 2 | 2 | 115 - 230 | 50/60 | 39.78 | 20.48 | 4574.89 | 360x40x10.0 | 99.8 | 1030 |
| RS6401-16x160-AMB | 16 | 160 | 2.5 | 640 | 40 | 20 | 20 | 2 | 2 | 115 - 230 | 50/60 | 44.16 | 22.73 | 5078.03 | 400x40x10.0 | 99.7 | 1150 |

One-line, red, 24.5-inch character

| Model number | Rows | Cols | Pitch (inches) | LED display assembly | LED driver assembly | Power supply | Internal cooling fan | Fan thermostat | On/Off switch | Rated input voltage (volts) | Rated input frequency (HZ) | Rated input current (115V) | Rated input current (230V) | Rated input power (watts) | Width x Height x Depth (inches) | Watt density (approximate) (watts per cubic foot) | Weight (nearest 10 pound increment) |
|-------------------|------|------|----------------|----------------------|---------------------|--------------|----------------------|----------------|---------------|-----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------------|--|--|
| RS8901-07x032-RED | 7 | 32 | 3.5 | 56 | 4 | 2 | 3 | 2 | 1 | 115 - 230 | 50/60 | 4.60 | 2.38 | 528.60 | 112x28x11.75 | 53.0 | 170 |
| RS8901-07x048-RED | 7 | 48 | 3.5 | 84 | 6 | 3 | 4 | 2 | 1 | 115 - 230 | 50/60 | 6.56 | 3.39 | 754.06 | 168x28x11.75 | 50.4 | 250 |
| RS8901-07x064-RED | 7 | 64 | 3.5 | 112 | 8 | 4 | 5 | 2 | 1 | 115 - 230 | 50/60 | 8.52 | 4.40 | 979.52 | 224x28x11.75 | 49.1 | 330 |
| RS8901-07x080-RED | 7 | 80 | 3.5 | 140 | 10 | 5 | 6 | 2 | 1 | 115 - 230 | 50/60 | 10.48 | 5.41 | 1204.98 | 280x28x11.75 | 48.3 | 420 |
| RS8901-07x096-RED | 7 | 96 | 3.5 | 168 | 12 | 6 | 7 | 2 | 1 | 115 - 230 | 50/60 | 12.44 | 6.42 | 1430.44 | 336x28x11.75 | 47.8 | 500 |
| RS8901-07x112-RED | 7 | 112 | 3.5 | 196 | 14 | 7 | 8 | 2 | 1 | 115 - 230 | 50/60 | 14.40 | 7.43 | 1655.91 | 392x28x11.75 | 47.4 | 580 |
| RS8901-07x128-RED | 7 | 128 | 3.5 | 224 | 16 | 8 | 9 | 2 | 1 | 115 - 230 | 50/60 | 16.36 | 8.44 | 1881.37 | 448x28x11.75 | 47.1 | 660 |
| RS8901-07x144-RED | 7 | 144 | 3.5 | 252 | 18 | 9 | 10 | 2 | 1 | 115 - 230 | 50/60 | 18.32 | 9.45 | 2106.83 | 504x28x11.75 | 46.9 | 750 |
| RS8901-07x160-RED | 7 | 160 | 3.5 | 280 | 20 | 10 | 11 | 2 | 1 | 115 - 230 | 50/60 | 20.28 | 10.46 | 2332.29 | 560x28x11.75 | 46.7 | 830 |

Two-line, red, 24.5-inch character

| Model number | Rows | Cols | Pitch (inches) | LED display assembly | LED driver assembly | Power supply | Internal cooling fan | Fan thermostat | On/Off switch | Rated input voltage (volts) | Rated input frequency (HZ) | Rated input current (115V) | Rated input current (230V) | Rated input power (watts) | Width x Height x Depth (inches) | Watt density (approximate) (watts per cubic foot) | Weight (nearest 10 pound increment) |
|-------------------|------|------|----------------|----------------------|---------------------|--------------|----------------------|----------------|---------------|-----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------------|--|--|
| RS8901-16x032-RED | 16 | 32 | 3.5 | 128 | 8 | 4 | 5 | 2 | 2 | 115 - 230 | 50/60 | 9.43 | 4.86 | 1083.95 | 112x56x11.75 | 54.3 | 370 |
| RS8901-16x048-RED | 16 | 48 | 3.5 | 192 | 12 | 6 | 7 | 2 | 2 | 115 - 230 | 50/60 | 13.80 | 7.11 | 1587.09 | 168x56x11.75 | 53.0 | 550 |
| RS8901-16x064-RED | 16 | 64 | 3.5 | 256 | 16 | 8 | 9 | 2 | 2 | 115 - 230 | 50/60 | 18.18 | 9.37 | 2090.23 | 224x56x11.75 | 52.4 | 730 |
| RS8901-16x080-RED | 16 | 80 | 3.5 | 320 | 20 | 10 | 11 | 2 | 2 | 115 - 230 | 50/60 | 22.55 | 11.62 | 2593.37 | 280x56x11.75 | 52.0 | 910 |
| RS8901-16x096-RED | 16 | 96 | 3.5 | 384 | 24 | 12 | 13 | 2 | 2 | 115 - 230 | 50/60 | 26.93 | 13.87 | 3096.51 | 336x56x11.75 | 51.7 | 1090 |
| RS8901-16x112-RED | 16 | 112 | 3.5 | 448 | 28 | 14 | 15 | 2 | 2 | 115 - 230 | 50/60 | 31.30 | 16.12 | 3599.66 | 392x56x11.75 | 51.5 | 1280 |
| RS8901-16x128-RED | 16 | 128 | 3.5 | 512 | 32 | 16 | 17 | 2 | 2 | 115 - 230 | 50/60 | 35.68 | 18.38 | 4102.80 | 448x56x11.75 | 51.4 | 1460 |
| RS8901-16x144-RED | 16 | 144 | 3.5 | 576 | 36 | 18 | 19 | 2 | 2 | 115 - 230 | 50/60 | 40.05 | 20.63 | 4605.94 | 504x56x11.75 | 51.3 | 1640 |
| RS8901-16x160-RED | 16 | 160 | 3.5 | 640 | 40 | 20 | 21 | 2 | 2 | 115 - 230 | 50/60 | 44.43 | 22.88 | 5109.08 | 560x56x11.75 | 51.2 | 1820 |

One-line, amber, 24.5-inch character

| Model number | Rows | Cols | Pitch (inches) | LED display assembly | LED driver assembly | Power supply | Internal cooling fan | Fan thermostat | On/Off switch | Rated input voltage (volts) | Rated input frequency (HZ) | Rated input current (115V) | Rated input current (230V) | Rated input power (watts) | Width x Height x Depth (inches) | Watt density (approximate) (watts per cubic foot) | Weight (nearest 10 pound increment) |
|-------------------|------|------|----------------|----------------------|---------------------|--------------|----------------------|----------------|---------------|-----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------------|--|--|
| RS8901-07x032-AMB | 7 | 32 | 3.5 | 56 | 4 | 2 | 3 | 2 | 1 | 115 - 230 | 50/60 | 6.34 | 3.27 | 728.53 | 112x28x11.75 | 73.0 | 180 |
| RS8901-07x048-AMB | 7 | 48 | 3.5 | 84 | 6 | 3 | 4 | 2 | 1 | 115 - 230 | 50/60 | 9.16 | 4.72 | 1053.30 | 168x28x11.75 | 70.4 | 270 |
| RS8901-07x064-AMB | 7 | 64 | 3.5 | 112 | 8 | 4 | 5 | 2 | 1 | 115 - 230 | 50/60 | 11.98 | 6.17 | 1378.08 | 224x28x11.75 | 69.0 | 350 |
| RS8901-07x080-AMB | 7 | 80 | 3.5 | 140 | 10 | 5 | 6 | 2 | 1 | 115 - 230 | 50/60 | 14.81 | 7.62 | 1702.86 | 280x28x11.75 | 68.2 | 440 |
| RS8901-07x096-AMB | 7 | 96 | 3.5 | 168 | 12 | 6 | 7 | 2 | 1 | 115 - 230 | 50/60 | 17.63 | 9.07 | 2027.64 | 336x28x11.75 | 67.7 | 530 |
| RS8901-07x112-AMB | 7 | 112 | 3.5 | 196 | 14 | 7 | 8 | 2 | 1 | 115 - 230 | 50/60 | 20.46 | 10.52 | 2352.42 | 392x28x11.75 | 67.3 | 620 |
| RS8901-07x128-AMB | 7 | 128 | 3.5 | 224 | 16 | 8 | 9 | 2 | 1 | 115 - 230 | 50/60 | 23.28 | 11.97 | 2677.20 | 448x28x11.75 | 67.1 | 700 |
| RS8901-07x144-AMB | 7 | 144 | 3.5 | 252 | 18 | 9 | 10 | 2 | 1 | 115 - 230 | 50/60 | 26.10 | 13.43 | 3001.98 | 504x28x11.75 | 66.8 | 790 |
| RS8901-07x160-AMB | 7 | 160 | 3.5 | 280 | 20 | 10 | 11 | 2 | 1 | 115 - 230 | 50/60 | 28.93 | 14.88 | 3326.76 | 560x28x11.75 | 66.7 | 880 |

Two-line, amber, 24.5-inch character

| Model number | Rows | Cols | Pitch (inches) | LED display assembly | LED driver assembly | Power supply | Internal cooling fan | Fan thermostat | On/Off switch | Rated input voltage (volts) | Rated input frequency (HZ) | Rated input current (115V) | Rated input current (230V) | Rated input power (watts) | Width x Height x Depth (inches) | Watt density (approximate) (watts per cubic foot) | Weight (nearest 10 pound increment) |
|-------------------|------|------|----------------|----------------------|---------------------|--------------|----------------------|----------------|---------------|-----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------------|--|--|
| RS8901-16x032-AMB | 16 | 32 | 3.5 | 128 | 4 | 4 | 5 | 2 | 2 | 115 - 230 | 50/60 | 13.38 | 6.88 | 1539.08 | 112x56x11.75 | 77.1 | 390 |
| RS8901-16x048-AMB | 16 | 48 | 3.5 | 192 | 6 | 6 | 7 | 2 | 2 | 115 - 230 | 50/60 | 19.73 | 10.14 | 2269.14 | 168x56x11.75 | 75.8 | 580 |
| RS8901-16x064-AMB | 16 | 64 | 3.5 | 256 | 8 | 8 | 9 | 2 | 2 | 115 - 230 | 50/60 | 26.08 | 13.40 | 2999.20 | 224x56x11.75 | 75.1 | 770 |
| RS8901-16x080-AMB | 16 | 80 | 3.5 | 320 | 10 | 10 | 11 | 2 | 2 | 115 - 230 | 50/60 | 32.43 | 16.66 | 3729.26 | 280x56x11.75 | 74.7 | 960 |
| RS8901-16x096-AMB | 16 | 96 | 3.5 | 384 | 12 | 12 | 13 | 2 | 2 | 115 - 230 | 50/60 | 38.78 | 19.92 | 4459.32 | 336x56x11.75 | 74.5 | 1150 |
| RS8901-16x112-AMB | 16 | 112 | 3.5 | 448 | 14 | 14 | 15 | 2 | 2 | 115 - 230 | 50/60 | 45.13 | 23.18 | 5189.38 | 392x56x11.75 | 74.3 | 1350 |
| RS8901-16x128-AMB | 16 | 128 | 3.5 | 512 | 16 | 16 | 16 | 2 | 2 | 115 - 230 | 50/60 | 51.47 | 26.43 | 5919.43 | 448x56x11.75 | 74.1 | 1540 |
| RS8901-16x144-AMB | 16 | 144 | 3.5 | 576 | 18 | 18 | 19 | 2 | 2 | 115 - 230 | 50/60 | 57.82 | 29.69 | 6649.49 | 504x56x11.75 | 74.0 | 1730 |
| RS8901-16x160-AMB | 16 | 160 | 3.5 | 640 | 20 | 20 | 21 | 2 | 2 | 115 - 230 | 50/60 | 64.17 | 32.95 | 7379.55 | 560x56x11.75 | 73.9 | 1920 |

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